JULY 1956

GAS

Transmission company tests bellows-type orifice meter for gas measurement

A CHILTON PUBLICATION

ENGINEERING • UTILIZATION • PIPELINES • MANAGEMENT

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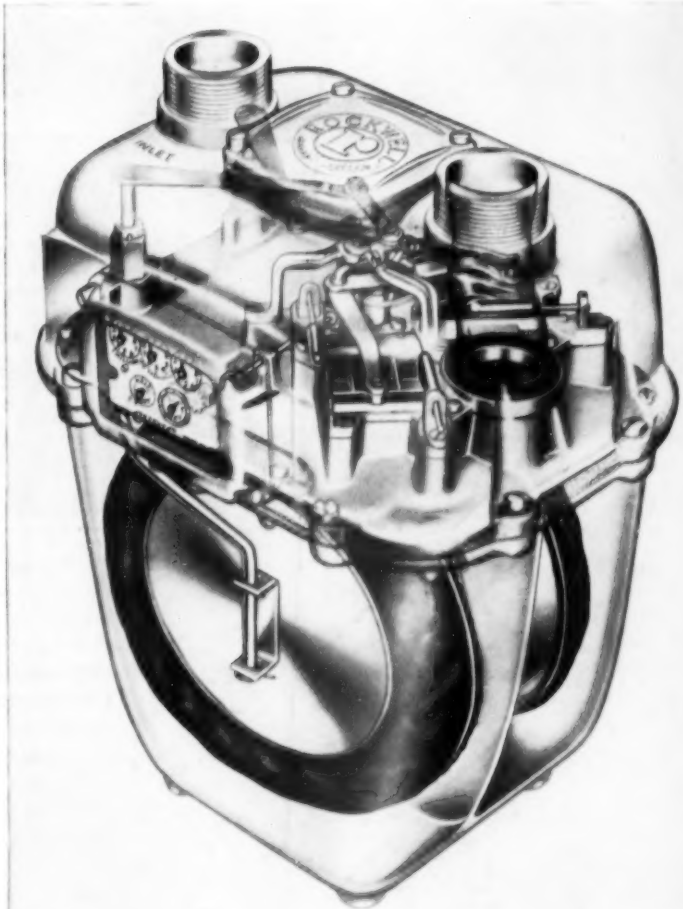

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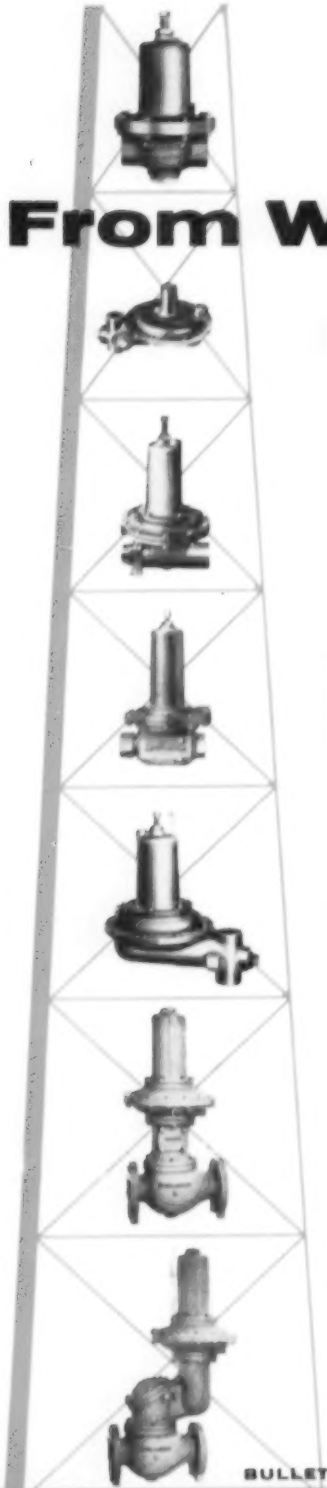

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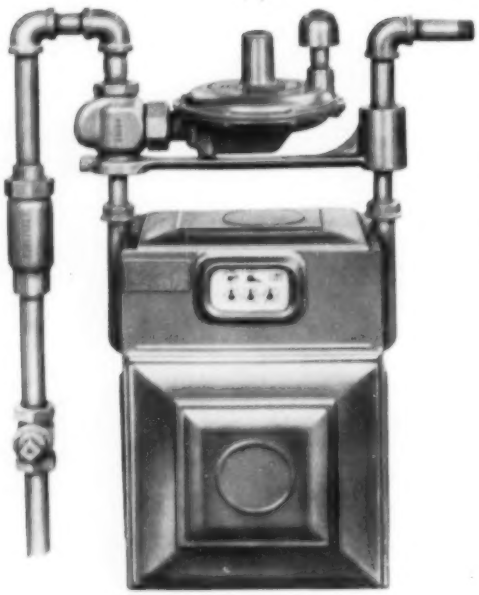

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GAS

32nd YEAR OF PUBLICATION

IN THIS ISSUE . . . .

The telephone order department is a vital part of any distribution company. The Peoples Gas Light & Coke Co. of Chicago has its phone order section organized very efficiently. This organization is discussed in an article on page 47. Northern Natural has found a way to cut overhead costs in spare parts inventory. This method is outlined on page 116.

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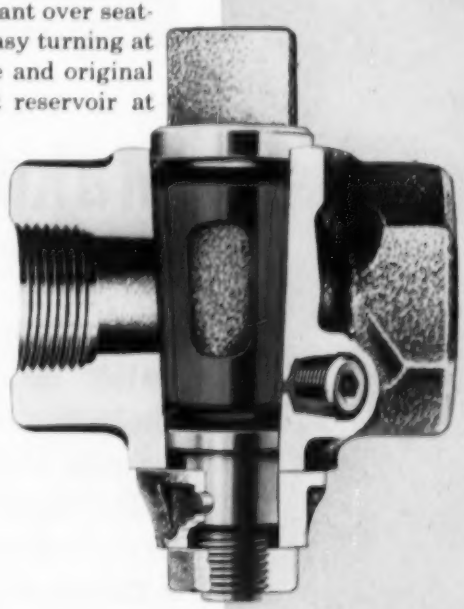

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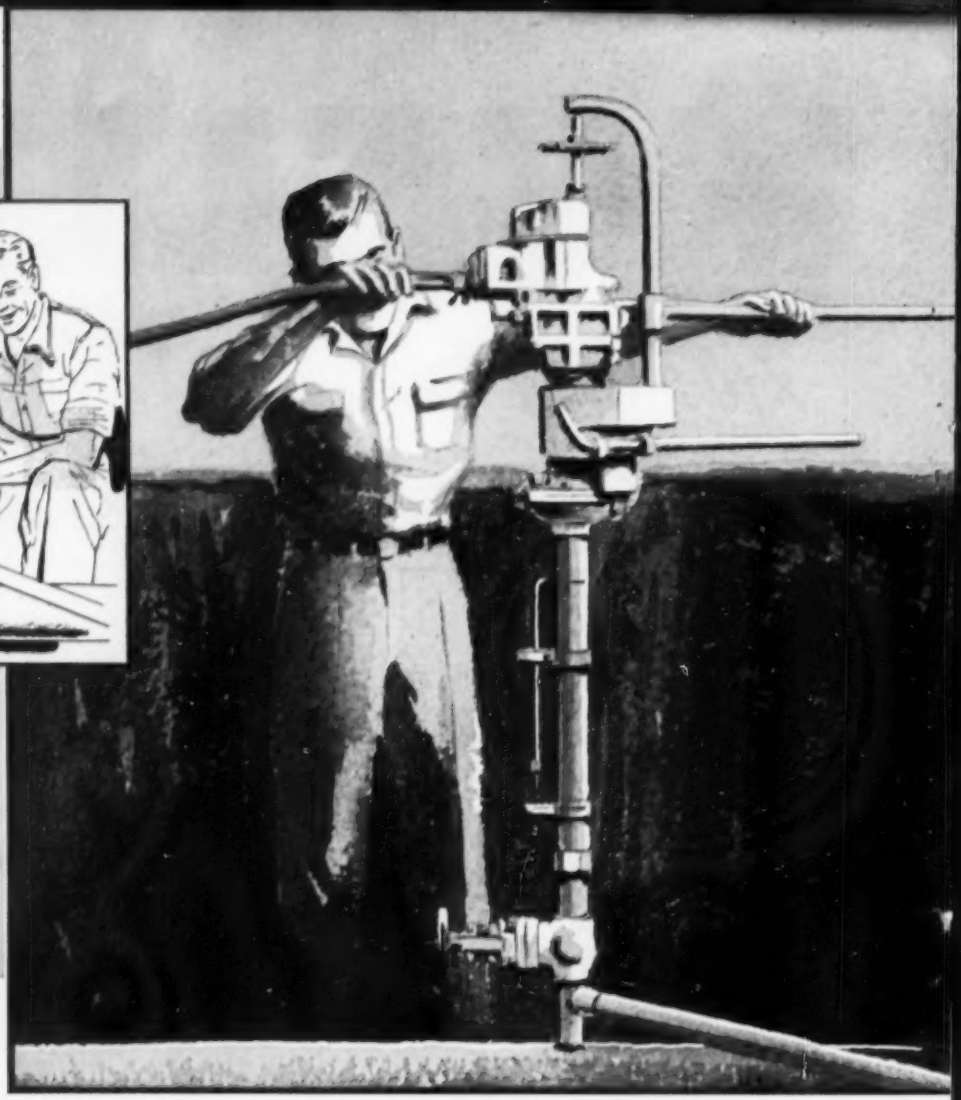

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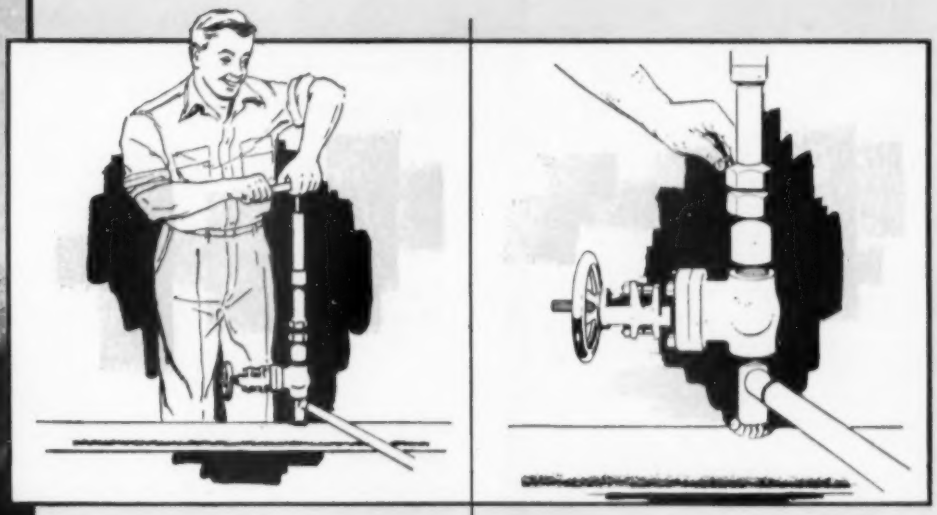

STEP 3: Attach completion plug, valve stem and bushing, or valve stem, depending on fitting used, to the completion machine. Mount on gate valve, open valve and insert.

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fittings, valve tees and service tees, to give you any type of connection you require.

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GAS Thermally Thinking

A RECENT newsletter from Armour Research Foundation states that about $3 billion will be poured into research in industrial laboratories during 1956. This is exclusive of research done in government-owned and military facilities. It is a tribute to American industry, but the sparkling highlight is the statement that between $5 billion to $20 billion will be invested as capital to take advantage of each $1 billion expended in industrial research. Can it be said, then, that research pays for itself?

We think it has and will in the gas industry. Generation of capital means new industrial, commercial, and domestic constructions and expansions for which the gas utilities can compete to supply energy service. Smart selling of their services by distribution companies results in additional gas market for themselves and their supplying pipeline companies. In some instances, the pipeline companies will reap a direct increase in sales from this industrial expansion. But, the net result is additional chances for the entire gas industry to sell more of its basic product.

Perhaps not so fundamental is the upgrading of the ultimate utilization of gas through the improvement of industrial technology—the product of research. Be it in the home, the commercial establishment, or the factory, in any area in which there is intensive industrial research, the utilization of gas will move up the technical scale. It will be used more efficiently in better equipment and processes. Such advances tend to relieve the need for the dump load concept and develop more demand for the fuel.

Within the gas industry itself, research is playing an ever increasing part in the daily life of the fuel suppliers and the utilization equipment builders. The projects currently under investigation for the gas companies in industrial, gas industry-sponsored, and gas company-owned research facilities are certainly more in number and of wider scope than in any period during the gas industry's history. These efforts are highly creditable and must be maintained, actually increased.

Research can give the answers to efficient, maximum use of installed and proposed distribution systems and operating methods. Along the gas transmission lines, the same considerations are true. Compressor stations, corrosion prevention techniques, communication, construction, and operating measures profit from extension of theory and equipment developed through research. The existing pipeline is made more efficient—the new pipeline has improved operating characteristics.

The problem is how a gas company—distribution, transmission, or integrated—can best take advantage of research. Technical developments come thick and fast these days. It is most difficult to keep track of those that directly affect gas industry operations, much less those that can mean improvement indirectly. No one person can do it. Even personnel in a gas company-owned research laboratory are hard pressed to accomplish such an objective.

Gas industry executives should press home the need for continuous awareness of the results of research so that department heads are ever casting about for technical advances that can be translated directly or indirectly into their business. The gas companies that are aware of and use research for advancement are the ones that will profit most during this American technical era.

J. Fred Ebdon

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This self-propelled Le Roi Tractair with Mobildrill attachment is altering hundreds of railroad bridge structures in the Salton Sea desert area of the Southwest. The bridge structure changes will permit the installation of a new train control system along a 200 mile area of the Southern Pacific railroad.

The Tractair Mobildrill attachment can be positioned in a wide range of angles for all kinds of drilling. The air-fed Mobildrill makes drilling quick and easy for the operator. On this job, contractors take advantage of the Tractair's versatility and mobility to reach work sites out on the desert sands.

How Railroad Uses Tractor-Compressor to Lick 200-mile Job in Desert Sands

Drilling rig mounted on combination unit, speeds from one working location to another.

Le Roi Tractair mobility not hindered by the dry, loose sand.

On the job, Mobildrill swings easy, gets into tight corners, saving hours in weekly drilling time.

Shifting sands of the desert pile up some equipment problems on the new train-control system project now under way between Colton, California and Yuma, Arizona.

The T. M. Page Corp., subcontractor on the 200-mile project says, "We found an answer in the Le Roi Tractair. It's one machine able to crawl through this very loose, dry sand under its own power. It's versatile. Most of the other machines need a crawler tractor to get them in and out of the work sites."

The Tractair with its air-fed Le Roi-Cleveland Mobildrill attachment is drilling hundreds of concrete supports for alteration of bridge structures. The Mobildrill makes drilling easy for the operator, as it can be swung to a variety of angles for all kinds of drilling.

Because Tractair is a combination 125-cfm air compressor and a 42-hp wheel tractor in one self-contained unit, it can be equipped with a wide variety of attachments. These include a front-end loader or a backhoe, plus dozens of accessories and air tools for most any need.

Three other Le Roi compressors are used on the project. "Perfect" service for all four Le Roi machines is provided by the distributor, according to the contractors. All of the Le Roi units work 8 to 9 hours each day in the hot climate.

T-52

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

highlights

GAS SPOT NEWS, TRENDS, COMMENT ON GAS INDUSTRY AFFAIRS

Don't overlook air terminals as good gas loads. Most airlines are handling more passengers than ever before and the trend seems likely to continue. This means preparation of in-flight meals will have to increase accordingly; airport restaurants, snack bars, etc., will also be expanded as major airport projects get underway to enable facilities to handle jet airliners. Brooklyn Union reports the $65 million Terminal City at Idlewilde airport used 43.5 MMcf last year for ground and flight kitchens, heating storage and cargo buildings, water heating, and incinerators.

The National Coal Association marks a recent decision by U. S. Court of Appeals, Philadelphia, as a partial victory for those who want ". . . to prevent the waste of natural gas through uncontrolled direct sales." Under the decision, the FPC can prohibit a pipeline company from making direct sales to an industrial customer where the result is to divert gas from existing customers. Gas conservation was not an issue in the proceedings.

Oil Heat Institute of Washington recently had its wrists slapped from the bench of a court of law over the way in which it tried to scare out property owners from leasing ROW to Pacific Northwest Pipeline Corp. for its now-near-completion Scenic Inch line. The institute sent out "warning" letters to lawyers or property owners along the proposed (then) pipeline pointing out that granting easements for a pipeline across property would result in installation of high-pressure lines on which explosions "are not infrequent." The judge hearing the case said, "it strikes this court as dirty work at the crossroads." It seems to us the gas, oil, and electric industries should not waste their time in fighting over the "safety" of the competitive fuel. The only result is merchandising in quarrels. Gas industry managements are ever striving for safer, accident-free operation; we know many oil and electric industry people are doing the same thing. This recent promotion by the Oil Heat Institute of Washington just looks silly.

Plans to liquefy natural gas for transporting in barges keep cropping up. Most of them stem from the old project to bring LNG up the Mississippi and vaporize it at Chicago, with the thermal effect of the expansion being used for refrigeration in the Chicago Union Stockyards. Latest news, two such barges have been built and tested in coastal waters. One barge is designed as the transport element and the other is for the liquefaction operation—to be done chiefly by refrigeration. Balsa wood has been used for insulation in some of the tank units aboard the barges, but tests indicate that this material is not the final answer for insulation to meet the rigid service and safety requirements. These test barges are designed for coastal work only; later, ocean-going ships may result from the research. Purpose—liquefy natural gas available in the Middle East and import it to England and/or the United States.

Notes from an editor's notebook—

Gulf Interstate has FPC approval to spend $2 million to increase capacity of its pipeline 401 MMcf daily. Wonder if additional horsepower requirements will be in the form of completely automatic compressor stations—still a lot of interest around in distribution companies on the use of new pipe materials, such as new reinforced plastics and ductile iron. Reports are very optimistic—Liberal Party in Canada finally convinced opposition Tory and C.C.F. (socialist) parties that it would be better to get the Trans-Canada built (or at least started) rather than spend too much time lashing out at the nationality of the builders. Parliament granted an $80 million loan designed to get the pipeline started, but the Honorable Members fist-fought, filibustered, and generally raked "Texas Millionaires" over the coals—STANDARD FOR FIELD WELDING OF PIPE LINES, API Std. 1104, 4th Edition, dated May 1956, now available. AGA joined with API, AWS, and others to furnish representatives on a formulating committee that prepared the standard. The committee, headed by Natural Gas Pipeline Co. of America's R. G. Strong, should be commended for an excellent, practical work.

One of the most extensive pipeline supervisory control systems is being planned for Texas Eastern's proposed products line. The system, to be installed by AT&T, will extend from Baytown, Texas, to Moundsville, W. Va., with a lateral to Chicago.

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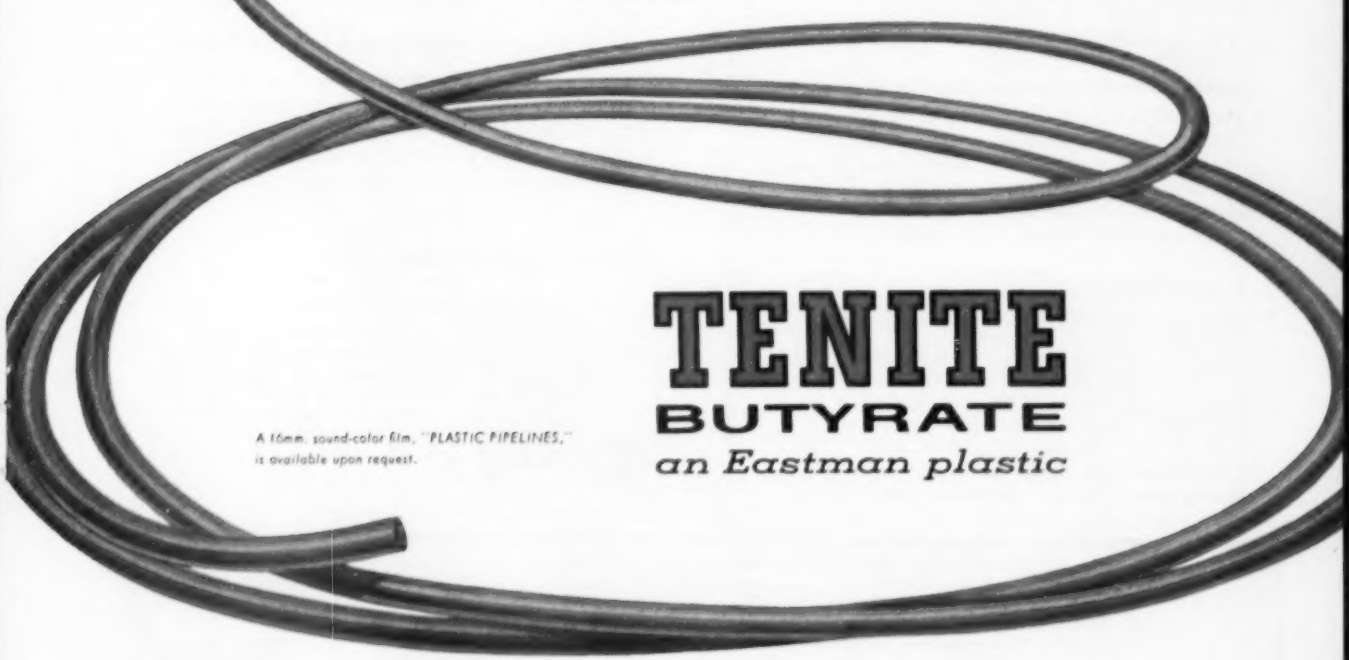

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*regulatory and legislative trends

Accelerated tax depreciation and utility rate-making

THERE have been many regulatory decisions prescribing accounting for accelerated tax depreciation by utilities, but only recently have decisions been rendered concerning the treatment of such depreciation in the fixing of utility rates. The growing importance of this subject to management is manifest from the realization that the gas industry in the United States charged $329 million as expense for depreciation in 1954. How will liberalized depreciation affect the investor and ratepayer?

Legislative history

The National Association of Railroad and Utilities Commissioners' committee on depreciation described the legislative history in its 1955 report thus: "It is pertinent to inquire as to the Congressional purpose or intention in enacting the liberalized depreciation methods for tax purposes.

"Fortunately, Congress has made its position clear. It has said that bringing tax depreciation allowances more in conformity with the economic facts of depreciation would, among other things, reduce some of the risks inherent in business investment, encourage more rapid replacement of obsolete plant and equipment and provide more working capital. It should be noted that Congress was considering general income tax legislation and there is no indication that it was concerned with problems peculiar to the regulation of public utilities.

"Prior to the enactment of the Internal Revenue Code of 1954 there was no legal restriction as to the depreciation method which a taxpayer might employ, but, the taxpayer was under severe requirement to prove that his depreciation deductions resulted in a correct determination of income.

"It was claimed the Internal Revenue Service administered these requirements too strictly. In the hearings before the Congressional committees there was lengthy criticism of the depreciation policies of the Internal Revenue Service and profuse testimony that the straight-line depreciation method which was usually employed in the past did not conform to the actual pattern of loss of economic usefulness of property. Such testimony cited heavier wear and tear in the earlier years of service life and the impact of technological improvements. It was claimed that since World War II the impact of technological improvements had been tremendous. One witness claimed that the industrial plants of the United States have lagged behind other nations in plant modernization. Witnesses argued that the tax rates at the 52% level, and with inability under the tax laws to provide what was considered to be adequate depreciation, there was a consequent reluctance to replace obsolete equipment. It was further argued that by liberalizing depreciation under the tax laws, the modernization of America's industrial capacity would be stimulated.

"Congress looked favorably on these arguments and wrote liberalized depreciation provisions into the tax code. It should be noted that unlike the accelerated amortization provisions of Section 124-A of the previous code (continued as Section 168 of the new code), relating to defense facilities, the liberalized depreciation provisions are not restricted to the financing of facilities needed for defense, in lieu of direct grants or loans for such purposes. Rather, the revisions with respect to depreciation were based on what Congress considered to be sound depreciation principles, viz., that in many cases property suffers its heaviest usage and loss of economic value in the early years of service life. The liberalized depreciation provisions are applicable to all types of tangible depreciable assets, including farm equipment, machinery, and buildings, rental housing, and industrial and commercial buildings as well as machinery and equipment, and not defense facilities alone. Taxpayers are not precluded from more rapid write-off than is permitted by the declining-balance method if facts and circumstances justify such action. The liberalized depreciation methods, however, are limited to new assets acquired and placed in service after Dec. 31, 1953."

Viewpoint of NARUC committee on depreciation

The NARUC depreciation committee, composed of members from 11 commissions regulating utility rates, reached this conclusion: "There can be no doubt that Congress intended to allow all persons investing in new depreciable business assets after Dec. 31, 1953 more liberal deductions for depreciation expense in the determination of taxable income. The allowance of more depreciation than is reflected by the straight-line method was considered to help mitigate the risk inherent in investment in depreciable facilities by permitting more rapid recovery thereof, thus permitting quicker reduction in debt, aiding in the financing of new plant, or making more working capital available, and at the same time conforming more nearly with the actual occurrence of depreciation for many classes of property.

"When one of the more liberal depreciation methods is used for Federal income tax purposes the problem presented is how to treat the tax reduction for rate making purposes. In the consideration of this question it should be recognized that both depreciation and tax expense are involved since it is the change in the depreciation expense for tax purposes that creates the change in

*A monthly commentary on national and state developments by an expert in the field of utility law.

Regulatory ... Accelerated tax depreciation was considered by the Pennsylvania PUC

the income tax expense. The Committee on Accounts and Statistics in its statement suggests consideration of the following alternative treatments:

"(a) Permit the amount of liberalized depreciation to be recorded in the accounts and allowed for rate purposes. In theory, this would require higher rates to cover the additional depreciation less the effect thereof on income taxes; or

"(b) Permit additional depreciation to be charged in the accounts and allowed for rate purposes equal to the tax reduction caused by liberalized depreciation. This procedure would have no immediate effect on net income and on rates for service although in the long run it would be favorable to consumers if the additional accumulated depreciation is deducted in determining the rate base; or

"(c) Permit depreciation charges under present practices to be recorded in the accounts and allowed for rate purposes with the tax reduction from liberalized depreciation being reflected in tax expenses. Theoretically, this procedure would pass the income tax reduction on to consumer via lower rates.

"In general, this committee favors the computation of depreciation expense for public utility accounting and rate purposes according to the straight-line method and the recording of income taxes each year at the actual tax liability for that year.

"However, if by reason of the provisions of the Internal Revenue Code of 1954, an additional expense allowance is made by regulatory commission, it is recommended that the allowance should be recorded as depreciation expense—the item which Congress was dealing. In this way there will be a balancing of interests in that the customer will pay more for depreciation expense but in return will realize an equivalent credit in the rate base. The treatment would, in effect, charge the customer more rapidly for the cost of plant consumed, but would give him *pro tanto* credit through reduction in the rate base. This would be fair treatment—fair alike to the utility and the customer."

Pennsylvania Public Utilities Commission's opinion

The Pennsylvania commission adopted rate case principles concerning accelerated tax depreciation, which it said "will be fair to the customer and to all types of utility companies." That commission added, "it is our present opinion that regulatory procedure requires the tax effect of accelerated depreciation be accorded the same treatment for accounting purposes and for rate case purposes."

In a recent rate case, the Pennsylvania regulatory commission asserted: "Prior to the issuance of this order, this commission has not dealt with the accounting or rate treatment of the tax effect of accelerated depreciation. This commission has authorized normalization of the tax effect of amortization of emergency facilities for accounting purposes, but we have not dealt with the matter in a rate order, which, incidentally, would also involve the proper rate case treatment of the accumulated offsetting normalization credits, whether they be designated Reserve or Restricted Surplus. No rate order by any other state commission has been reported dealing with accelerated tax depreciation, although several states (15 or more) have authorized normalization of income taxes for accounting purposes, with several of those states stating specifically that such accounting treatment was not effective for any other purpose, such as a rate case or approval of security issues.

"Respondent and other proponents of normalization of the tax effect of accelerated tax depreciation for rate purposes usually rely principally on the argument that utility rates based on actual taxes paid would discriminate against future customers in favor of present customers and also that accelerated tax depreciation results in fact in a present-day 'deferral' of taxes, which will be offset in future years when accelerated tax depreciation will be lower than straight-line depreciation. It is also said that 'congressional intent' was to allow the lower tax, in effect, as a temporary government loan, at zero interest, to be paid back through higher taxes in the future.

"Opponents of normalization, for rate purposes, of the tax effect of accelerated depreciation, contend that utility rates must be based upon income taxes actually paid; that the tax saving is a permanent saving if plant construction in future years equals or exceeds present construction levels; and that congressional intent creates no government loan because no liability exists.

"Our conclusions regarding the conflicting contentions as to principles and some of the very practical problems involved, are summarized as follows:

1. There may or may not be an actual tax saving or permanent deferral, depending upon the relative level of new plant construction in 1954 and each future year.

2. Under the extreme assumption that respondent will add no additional plant after 1954, actual taxes will be less than normalized taxes for the next 17 years. This tax saving period will be extended considerably by sizable plant additions, estimated by respondent to be over $200,000 annually in future years.

3. Future changes in the income tax law or in tax rates may drastically modify or eliminate future tax normalization now contemplated to be a certain offset to present-day normalization.

4. Since the advent of modern income taxes, some costs of new utility plant have been and are now being expensed for tax purposes in the year incurred without normalization of income taxes now, or in past years which might now benefit present customers. An extreme example is a natural gas company rate case presently before this commission, in which the company contends for the nonrecognition of $32,000 of accelerated tax depreciation with a tax saving of $17,500, but claims no tax normalization for $336,000 of test year Productive Well Drilling Costs, recognized for all other purposes as cost of plant, but deducted for tax purposes in accordance with present and past Income Tax Law. Natural gas utilities also take Statutory Depletion which is an arbitrary percentage depletion allowed for tax purposes. Respondent and other types of utilities follow a similar practice, by deducting for tax purposes plant costs such as Interest, Taxes and Pension Costs Capitalized. During the test year, respondent deducted for tax purposes $48,082 of Interest Capitalized, $2949 of Taxes Capitalized and $10,449 of Pension Costs Capitalized, but claims no normalization of Income Taxes for these items.

5. In prior years, the annual depreciation rate, the amount of accrued depreciation and the cost base of property of many utility companies for tax purposes, bore no relation to book depreciation or to depreciation allowed as such for rate purposes. Under such conditions in the past, normalization of income taxes was neither advocated nor allowed in rate proceedings, although tax depreciation

Continued on page 92

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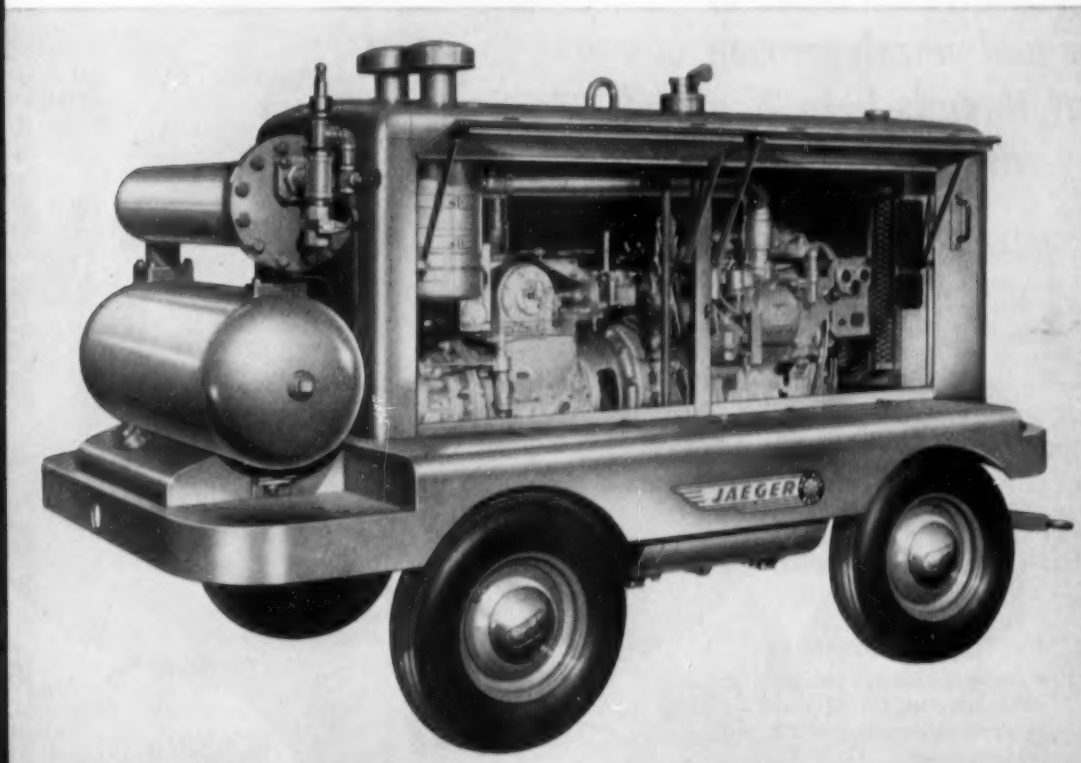

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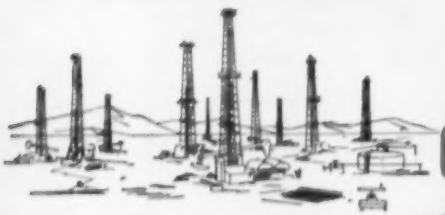

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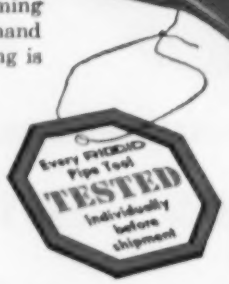

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WASHINGTON

FPC takes first major step to control gas producers

By NEIL REGEIMBAL
GAS Washington Bureau

WASHINGTON, from where the gas industry sits, apparently is now revolving counterclockwise, with the Federal Power Commission taking the first major step to control independent gas producers under laws it disputes violently, and President Eisenhower apparently indicating he might next year sponsor gas legislation to replace that which he vetoed this year.

Actually, neither of these moves is too surprising. The FPC warned long ago that failure of a gas bill this year would bring an end to its waiting to administer laws that are on the books (no matter how much it dislikes them) and President Eisenhower indicated in his veto of the Harris-Fulbright bill that he favored the basic premises of the measure.

FPC proposals to limit the types of escalation clauses and thus begin producer control are splitting the gas industry, pitting the distributors, who favor the move, against the producers, who want to retain the clauses. The move is the first real step at controlling the 5000 to 8000 independent producers—what they can charge and how they can arrive at the figures.

There are half-dozen strings attached to the possibility of a Presidential gas bill that, for the time being at least, take most of the glitter out of the prospect.

First, the indications that the President might get behind another gas bill next year—either by requesting it in his State of the Union message or by backing it at a press conference or in a speech—are at best weak, and far from binding. The only really strong indication that the White House is heading in this direction is a speech by Dillon Anderson, special assistant to the President for national security affairs, before the Panhandle Producers and Royalty Owners Association at Amarillo, Texas, shortly after the veto.

After pledging the Administration to the philosophy of as much freedom as possible for competitive enterprise and against federal regulation of "prices paid to the producers of commodities," Mr. Anderson said in part:

"It is the position of the President that legislation conforming to the basic objectives of the Harris bill is needed. . . . In view of the fundamental soundness of these principles, I think it is reasonable to expect that such legislation will be enacted."

This last sentence has probably led to many of the current rumors that some kind of promise has been made, but if it has, no one will admit to it. Mr. Anderson told *GAS* that the sentence represents "all I can say on the subject."

Similarly, Republican spokesmen in Congress, although they believe the White House will at least back gas legislation next year, say they have not had any formal or informal word from the White House.

It seems clear to most observers that assuming the Republicans retain control of the White House, the President will almost have to give official weight to any gas bill if there is going to be one next year. If the GOP regains control of Congress, the White House naturally would call the tune on such a major piece of legislation.

If the Democrats retain their control, it's the same story. Speaker of the House Sam Rayburn, according to cloakroom talk, is still sputtering mad over the veto, and has made it pretty clear to friends that he is not about to lift a finger to promote another such bill. Rayburn is, of course, under strong pressure from his Texas colleagues to steer through another gas bill, but he is believed to be too hot over what he considers a "sell-out" to go along. A summer in the hot Texas sun, and on the sweltering campaign circuit, probably won't cool him off much.

There's still another stain marring the prospects of an Eisenhower-sponsored gas bill, if it comes. Most political pundits in Washington agree that any bill the President gets behind now won't come near actually freeing producers, but will instead lay down areas and ground rules under which FPC would be required to limit control over producers.

Therefore to get the kind of a bill the industry may agree on, there will have to be some sort of compromise worked out with the White House to prevent another veto—and that may be a tall order.

U. S. gets inquiries on gas system loans

THE government is getting its first timid inquiries from municipalities considering tapping a special $100 million revolving fund Congress set up last year for loans for local gas distribution systems. Undaunted bureaucrats expect the flood gates to open before long.

Federal lawmakers set up the fund in the 1955 housing bill to help local governments build sewer and water facilities as well as gas distribution systems. Several areas have secured loans for sewer and water uses from the keeper of this particular till, the Housing and Home Finance Agency's community facilities administration. But the first inquiries on its use for gas

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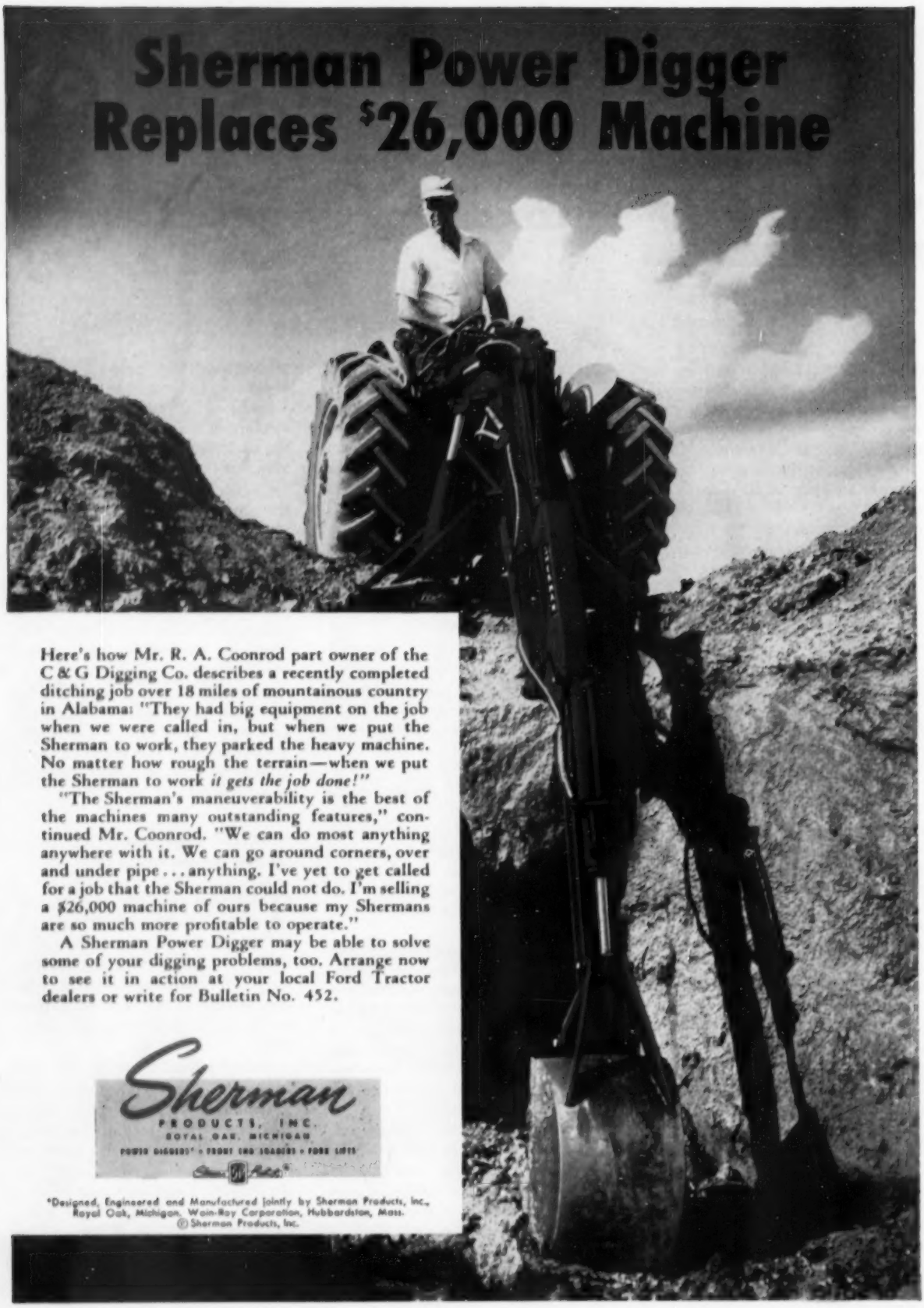
Sherman Power Digger Replaces $26,000 Machine



Here's how Mr. R. A. Coonrod part owner of the C & G Digging Co. describes a recently completed ditching job over 18 miles of mountainous country in Alabama: "They had big equipment on the job when we were called in, but when we put the Sherman to work, they parked the heavy machine. No matter how rough the terrain—when we put the Sherman to work *it gets the job done!*"

"The Sherman's maneuverability is the best of the machines many outstanding features," continued Mr. Coonrod. "We can do most anything anywhere with it. We can go around corners, over and under pipe . . . anything. I've yet to get called for a job that the Sherman could not do. I'm selling a $26,000 machine of ours because my Shermans are so much more profitable to operate."

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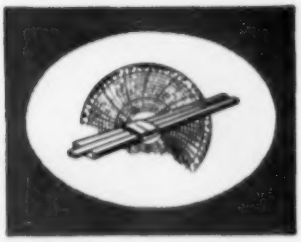
technical trends



• By GUY CORFIELD

Accepted limit values of air pollutants

A pamphlet with the above title is available from the Bureau of Mines as its Information Circular 7682, and can be obtained free of charge by writing to the bureau's Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. It is of interest to gas industry safety engineers and others who have occasion to check plant areas where chemical or solvent fumes, or dusts, may endanger health or property, or may be concerned with plant emissions which may constitute a public hazard or nuisance.

From the standpoint of health, an extensive tabulation is provided, giving the average concentration of a substance in the air to which an industrial worker can be exposed for 8 hr daily for an indefinite period without injury or occupational disease, as agreed to by the American Conference of Governmental Industrial Hygienists, and as stipulated by some of the states. The values for any one substance are not identical, but agree in general and "present a clear-cut picture." The author was not successful in finding generally accepted standards for vegetation damage, or for industrial process emissions. As regards property damage he states "virtually any concentration of a pollutant, such as sulfuric acid or hydrogen sulfide, that will attack materials, will do some damage. Since property cannot repair itself like a living organism, it is a question of what can be tolerated."

Atomic power meets some roadblocks

Two important considerations appear to be slowing down the final design and actual start of construction of atomic power plants—safety and insurance. Major projects like Consolidated Edison's 140,000-kw plant near Peekskill, N. Y., and Commonwealth Edison's 180,000-kw plant near Chicago, are even reported to be hanging in the balance.

From the safety standpoint there is the possibility, even though considered remote, that the process may "get away" not by explosion as such but from other causes that might become uncontrollable. Disruption might occur from natural disaster such as flood or earthquake, by overheating from failure of controls, or from improper mixing of components by accident or unexpected corrosion, which would release large quantities of dangerous liquids, gases or smoke. Preventative or emergency control measures are being considered, but they are almost as formidable in complexity and cost as are the operating plants themselves. Any control mechanisms to prevent accidents can themselves conceivably fail, and therefore for maximum safety should be duplicated or backed up by other control devices. For instance, if the automatic control "rods" fail to prevent excessive heat buildup, a coolant pumping system should come into action, and if the primary power source to pump the coolant also fails an emergency power supply should be available; beyond all this, it might be thought necessary to have a heavy sealing cover in readiness to drop over the entire reactive element. Apparently it will require further experimentation at pilot or prototype plant scope to gain a better idea of what might happen in the various types of plants which have been proposed.

This has brought up the problem of insurance to cover possible damage to life and property resulting from a major failure or accident, which problem can well be as much of a deterrent as technical apprehensions. Private insurance groups are asserted not prepared to offer more than about $65 million insurance against atomic accidents, and industry does not feel that this is enough and is calling upon the government to raise the ante. The most recent proposal is for the government to agree to pay as much as $500 million beyond private insurance coverage.

These factors are in a sense putting the government on the spot, because of the desire to at least keep up in the world race for atomic development.

Offshore drilling island

Several items on this page have described the ingenuity and resourcefulness with which oil wells have been drilled in the off-shore waters along the Texas and Louisiana coast, using floating barges, and movable platforms. A recent development off the coast of California is equally interesting.

Engineered and constructed by the Monterey Oil Co. and the Texas Co., a drilling "island" has been created 1½ miles off the coast of Seal beach, at a water depth of about 45 ft. It is essentially a sand and gravel mound at the bottom, surrounded and protected by rock. The upper half is an angular concrete ring, filled with sand extending above sea level, providing a circular working area about 75 ft in diameter.

Wells are actually drilled and operated from the circular island portion. There are two levels, the upper being a working and drilling deck, and the lower sectionalized into "cellars" where wells terminate. "Conductor pipes" have been driven down through the island, and wells are drilled down through these pipes and then slanted to desired degree and direction.

More than 11 wells have now been drilled and are producing from two zones, but it is planned that as many as 70 wells can be put down if it is found desirable. Combined oil and gas is sent to shore in an 8-in. line, but as new wells come in their production can be handled through one or more of three parallel 3-in. lines for gauging purposes.

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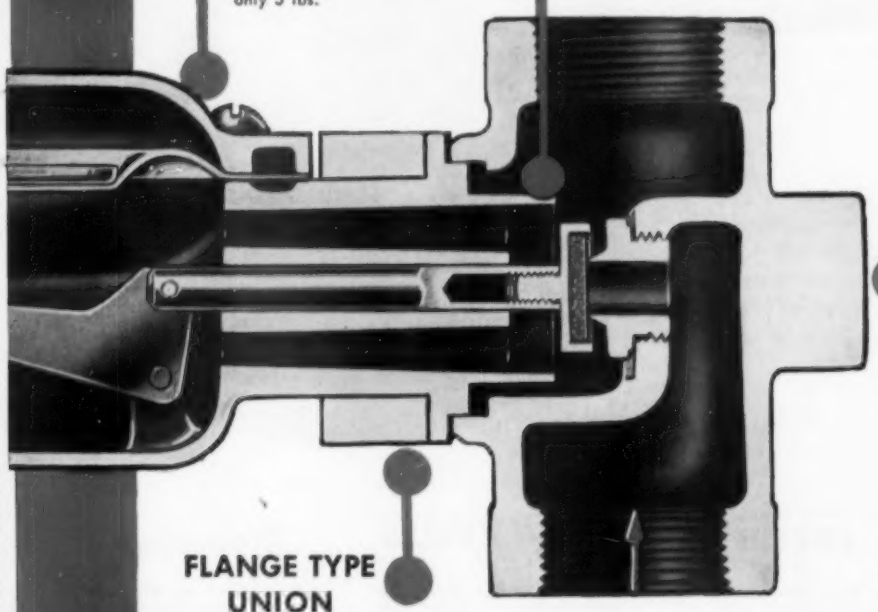

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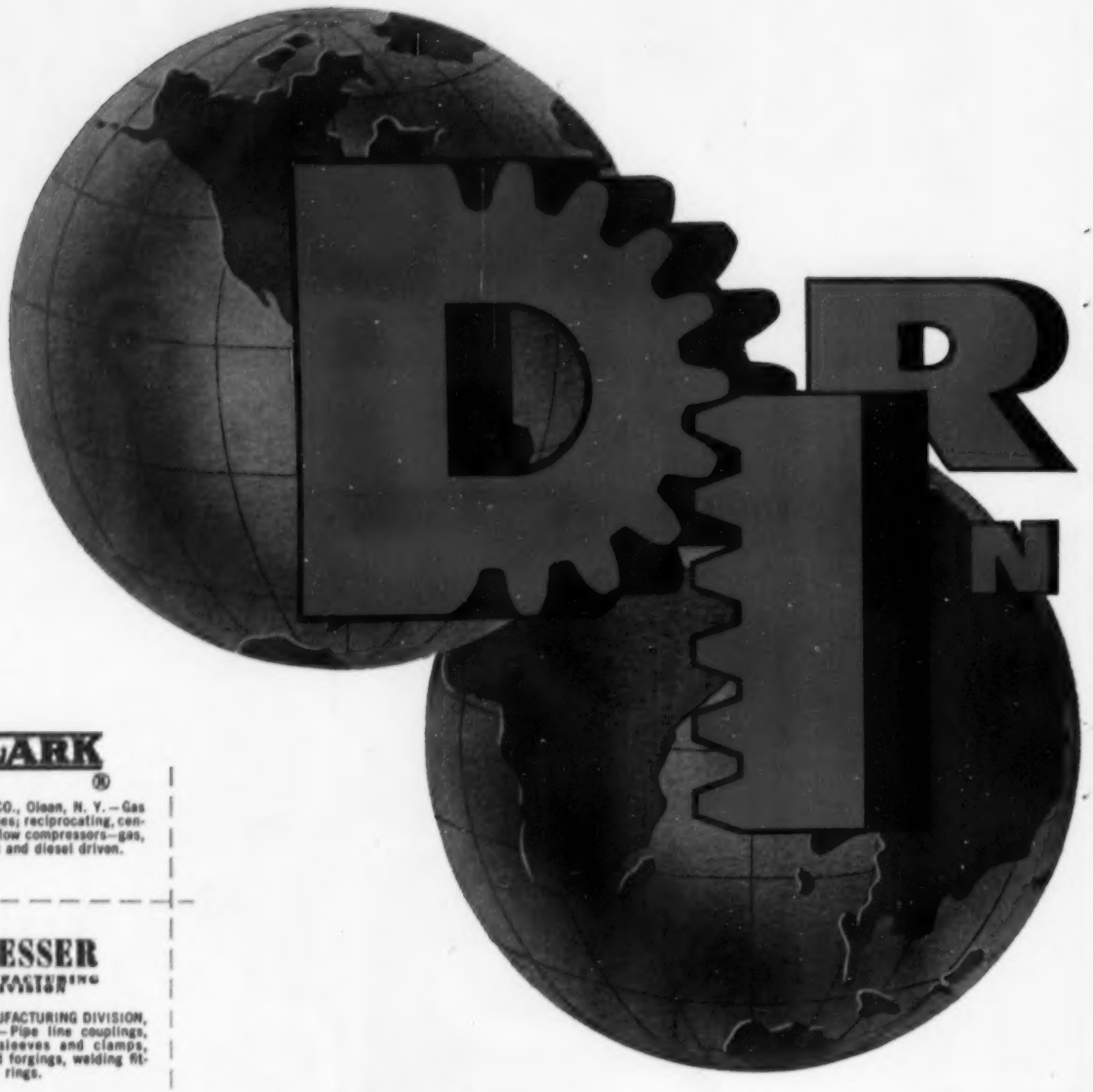

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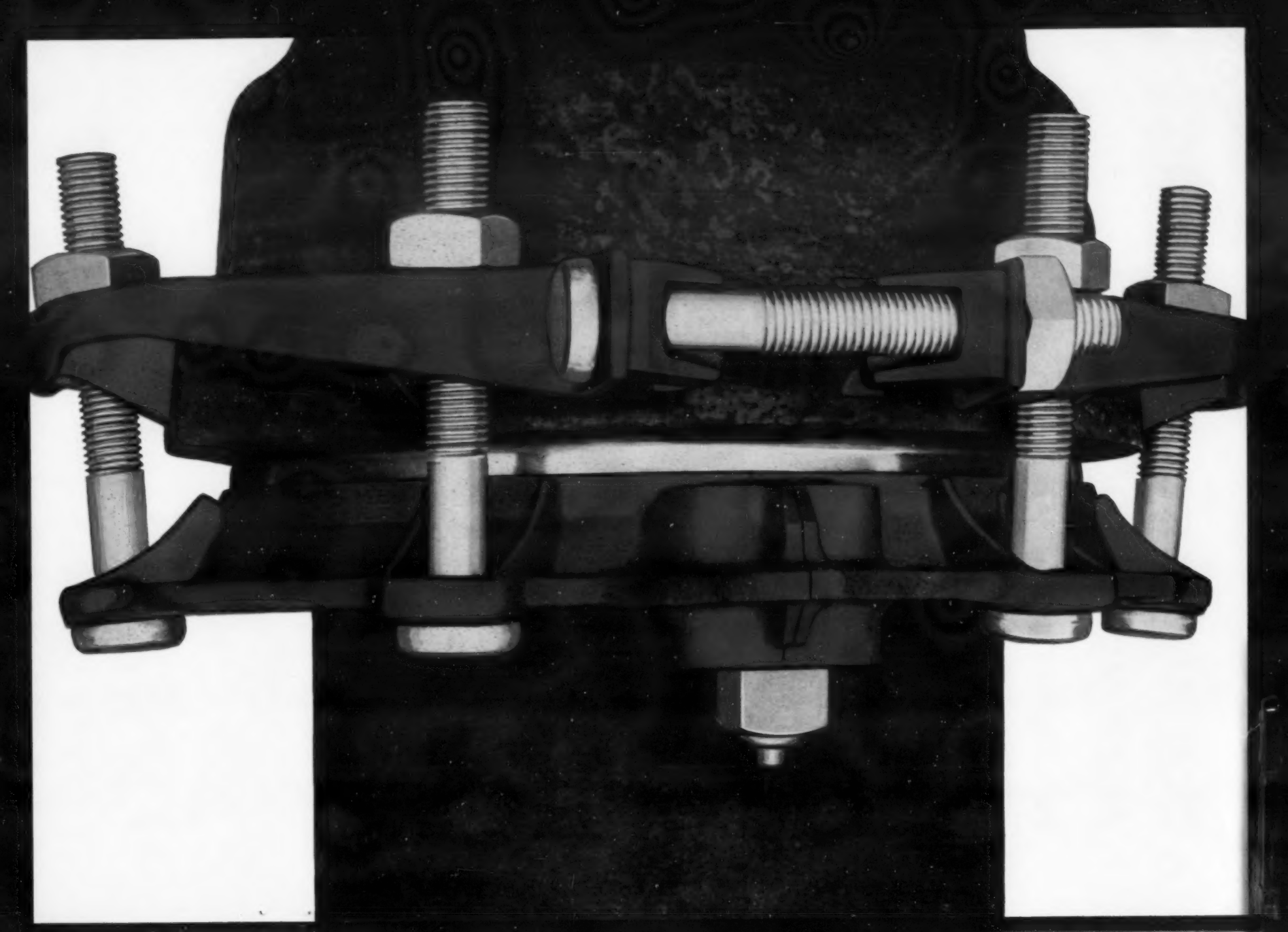

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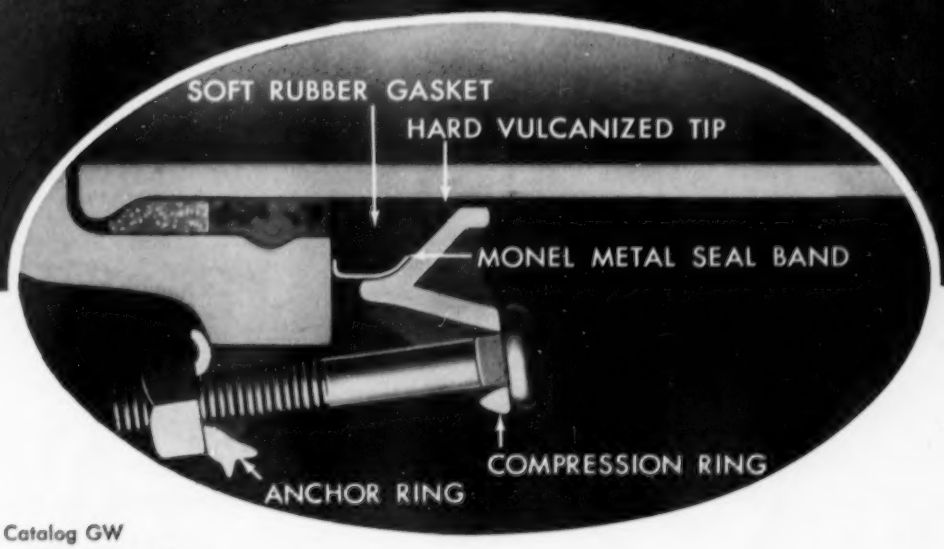

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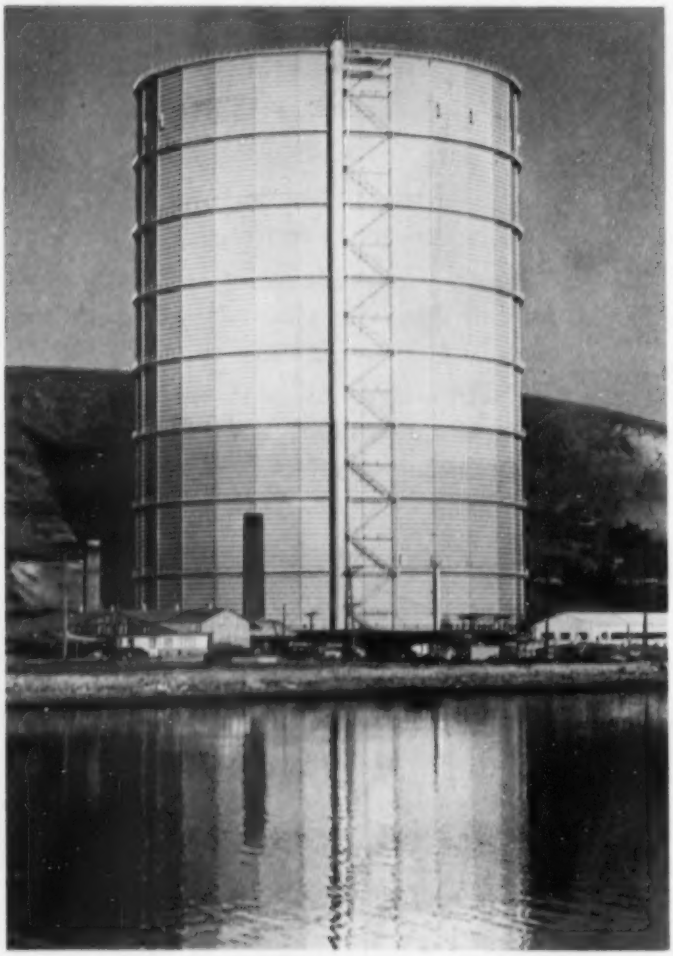

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Manufacturers of the Square "Gee" Line of Pipe Fittings

News about

B.F.Goodrich Chemical *raw materials*

Piping that won't corrode; carries oil, acids, chemicals . . . **made from Geon rigid vinyl**

GEON rigid vinyl is an exceptional material used by leading producers of pipe and fittings to provide cost-cutting installations.

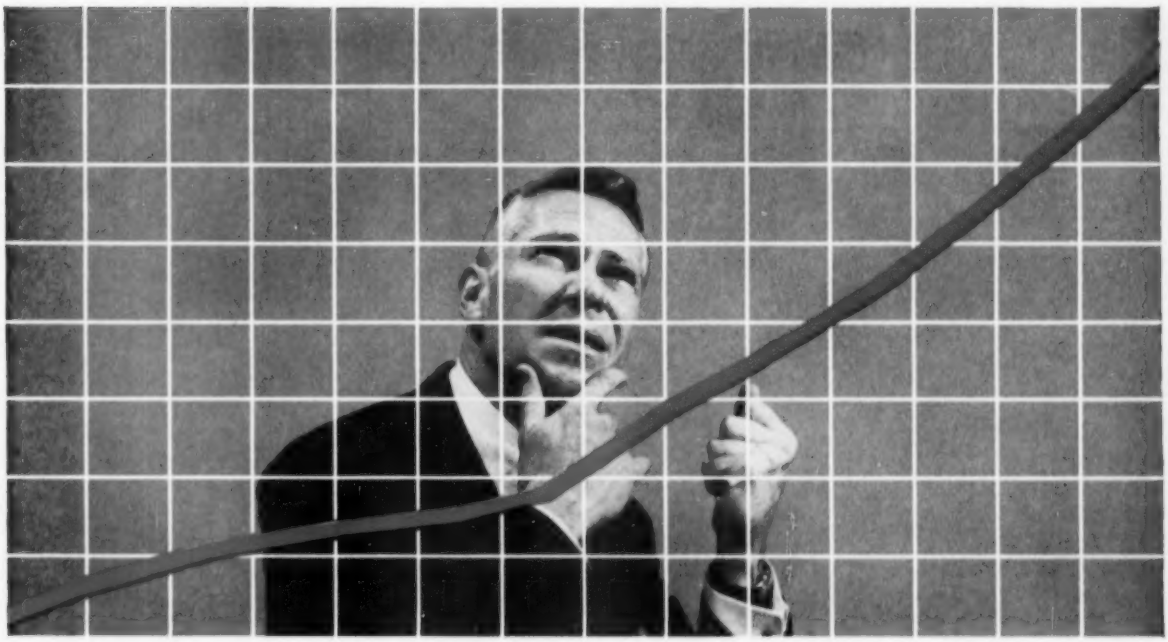
Geon-made piping is immune to galvanic corrosion, eliminating the major source of failure in underground lines. It has superior resistance to oil, acids, alkalis, and most chemicals . . . including attack by sour crude oil, salt water and corrosive fumes.

The smooth interior surface of Geon vinyl pipe reduces frictional head loss, and inhibits the buildup of deposits . . . adding years of maintenance free life. You'll find the light weight and simple assembly of rigid vinyl piping provide important savings in freight, time, and labor.

For a new booklet on specific properties of Geon materials for rigid vinyl piping, write Dept. DM-4, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

Would Rising Demands for Gas *Catch You Short?*



It will pay you to install a supplementary Philgas® system.

In times of peak demand you need a Philgas stand-by system to augment your gas supply on short notice. A Philgas system is inexpensive to install. Our technical representative will advise on the installation and the most desirable way for you to use Philgas.

Philgas is an exceptionally clean gas, free from contaminants. It is uniform in gravity and thermal value. And because a Philgas system is completely automatic it will save you money on labor costs.

But probably the most important consideration in installing a stand-by system is to have a safe, sure source of supply for times of increased demand. With a Philgas stand-by unit, you are assured of dependable supply *at all times*. Write for information.

PHILGAS Is America's Largest Selling Brand of LP-Gas!

Phillips 66 Philgas
THE ALL-PURPOSE FUEL

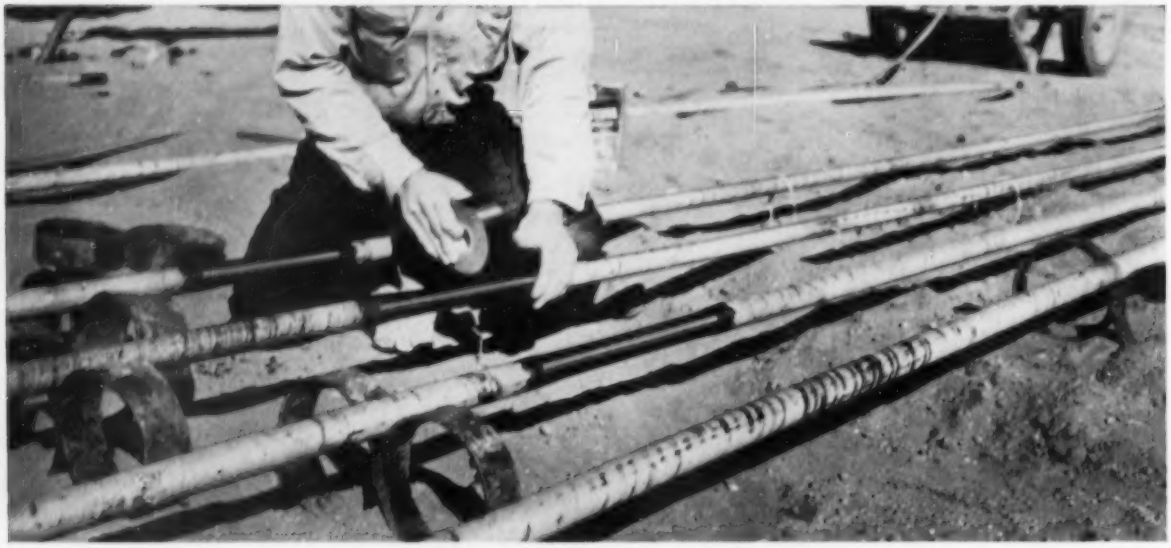
PHILLIPS PETROLEUM COMPANY

Sales Department • Bartlesville, Oklahoma

Offices located in
Amarillo, Tex., Atlanta, Ga., Chicago, Ill., Denver, Colo., Des Moines, Ia., Houston, Tex., Indianapolis, Ind., Kansas City, Mo., Minneapolis, Minn., New York, N. Y., Omaha, Nebr., Raleigh, N. C., Salt Lake City, Utah, St. Louis, Mo., Tampa, Fla., Tulsa, Okla., Wichita, Kans.

Polyken coating used exclusively on these welded joints

Why the Albuquerque branch of Southern Union Gas uses only Polyken "Controlled Strength" coating



Quick work . . . lasting protection. Southern Union Gas crewman wraps welded joints in the field with *Polyken* Polyethylene Tape No. 900.

***Polyken* Tape** fills the prescription here for the Southern Union Gas Company. The installation: service lines carrying natural gas to a development of new homes.

Mill-coated pipe is welded and the joint hand wrapped on the site. This method is far faster and cheaper than former methods.

Further advantages of *Polyken* Polyethylene Tape: easy to handle; compact in transportation and storage; simply applied; tough, durable, fast-sticking and secure; just the right stretch to conform to joints and caps. (That's what we mean by "Controlled Strength": the right combination of backing and adhesive to give you "all work—no waste".)

Want to figure application costs on your job? Let's sit down and work them out. Write, wire or phone today: The Kendall Company, *Polyken* Sales Division, Dept. G-G, 222 West Adams Street, Chicago 6, Illinois (RAndolph 6-4250).

Complete catalog, Sweet's Industrial Construction File, Sec. 8c/Ke

Polyken®

CONTROLLED STRENGTH

PROTECTIVE COATINGS

THE KENDALL COMPANY, POLYKEN SALES DIVISION

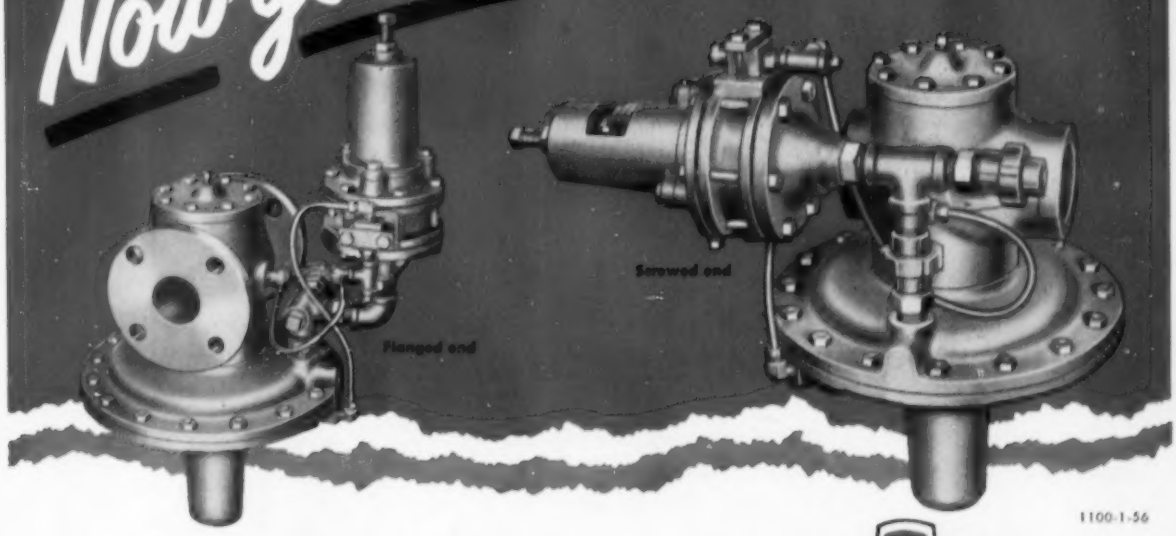
LINE PRESSURE GOING UP!

MEMO
FROM THE OFFICE OF THE PRESIDENT

Geo:—
Considering raising
line pressure
Better check this—
Now good up to
400 psi
Rehm.

Chaplin-Fulton '1100' REGULATOR

Now good up to 400 psi



1100-1-56

Now, more versatile than ever—good up to 400 psi. Your choice of three body assemblies—

2" flanged 250 lb.	rated for 400 psi
2" screwed end	rated for 400 psi
2" flanged 125 lb.	rated for 175 psi

All suitable for outlet pressure range from ounces to 150 psi with no change required in regulator or pilot—just change the pilot spring. It's accurate—versatile—compact! A good buy!

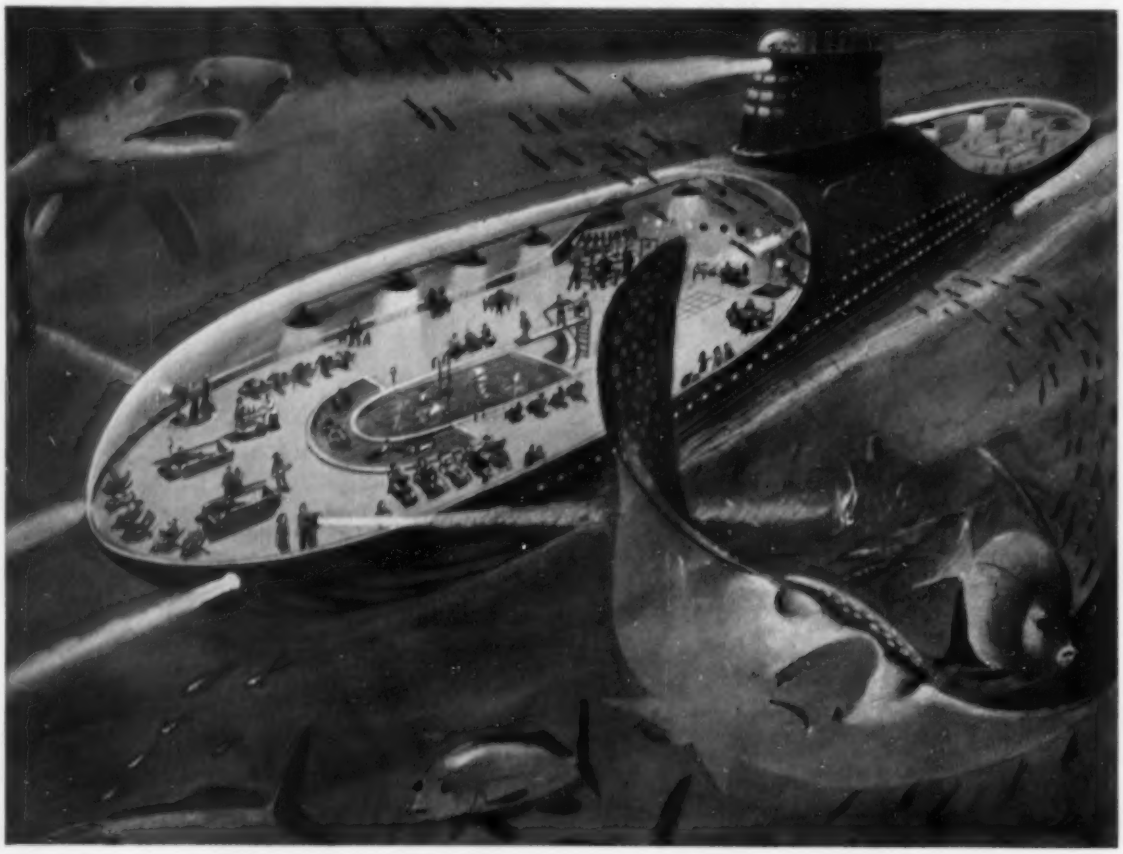
Why stock two, when Model '1100' will do?

And, if 400 psi is too low, why not try the all-steel Model '1200', good up to 1200 psi inlet and 600 psi outlet?

Full information on request.

ACCURATE CP MFG CO DEPENDABLE

Chaplin-Fulton
MANUFACTURING COMPANY
Pittsburgh 25, Pennsylvania



HUGE submarine liners with glass capable of withstanding tremendous pressure may offer the traveler of the future intimate glimpses of life under the sea and immunity from storms and seasickness.

100 years from now...

WE MAY SIGHTSEE UNDER THE SEA!

The world of the future—full of amazing, time-saving, health-giving products and machines. Still being used, however, will be the reliable cast iron water and gas mains laid today.

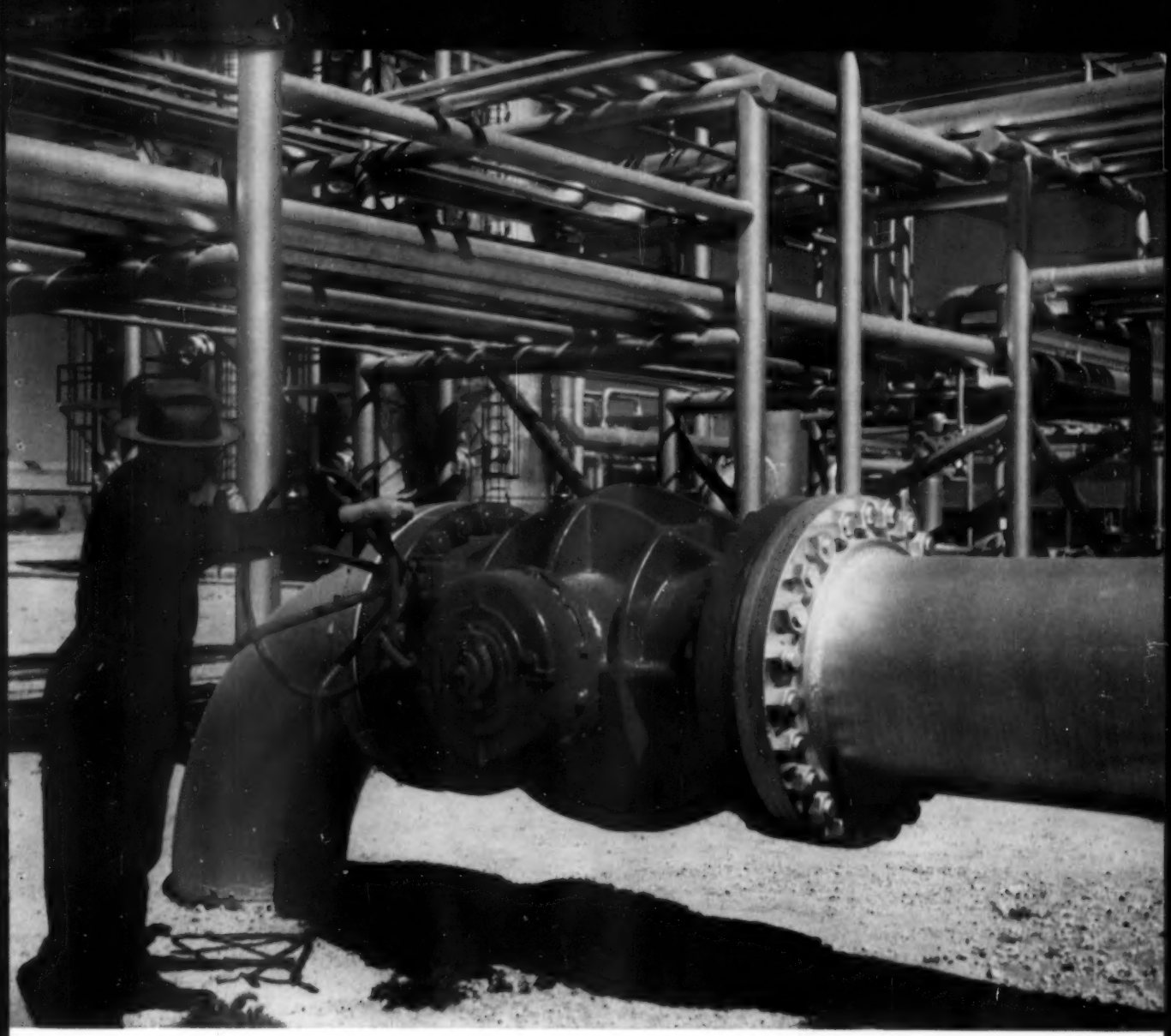
Records show that over 60 American cities from coast to coast are still served by cast iron water and gas mains laid more than a century ago. And modernized U. S. Pipe... centrifugally cast, quality-controlled from mines to finished product... is extra rugged, more dependable than ever.

U. S. Pipe is proud to be one of the leaders in a forward-looking industry whose service to the world is measured in centuries.

U.S.
cast iron
PIPE
FOR WATER, GAS, SEWERAGE AND INDUSTRIAL SERVICE
CAST IRON

U. S. PIPE AND FOUNDRY COMPANY, General Office: Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER FROM MINES AND BLAST FURNACES TO FINISHED PIPE.



How much does a valve cost?

A valve that fails in an emergency can cost millions of dollars in equipment and product loss. In any key spot, Rockwell-Nordstrom lubricated plug valves are your best insurance against this kind of loss. They operate instantly; they shut off positively; and they *stay* efficient. These are facts you can depend on—they have been *proven* through 40 years of outstanding performance.

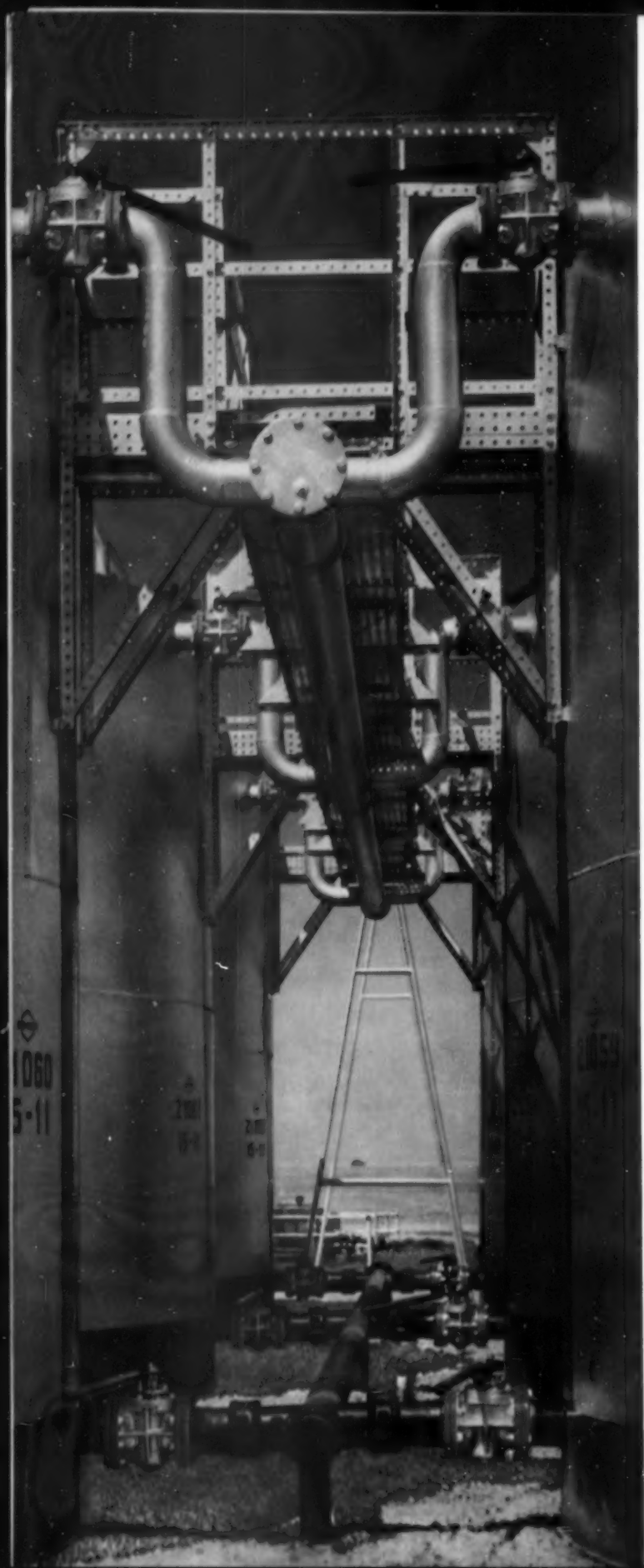
Rockwell-Nordstrom valves are available in a complete range of sizes and pressure ratings. They cost no more to buy, often less, than ordinary valves . . . and their dependability cannot be matched by any valve at any price. For more information, write: Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania.

Available at leading suppliers . . . everywhere.

ROCKWELL-Nordstrom **VALVES**

Lubricant Sealed for Positive Shut-off

40th Year *of lubricated plug valve leadership*



Liquid flow control... at its best

Rockwell-Nordstrom valves' proven dependability and economy keep costs down on *any* liquid service. Pressurized lubricant sealing for really positive shut-off, plus smooth quarter-turn operation, assures precise flow control on complex manifolds or remote pipe line valves. Because Rockwell-Nordstrom lubricants eliminate metal-to-metal friction, trouble doesn't have a chance to start. This means that yearly cost is much lower than ordinary valves. Original cost is no more, and often less.

Rockwell-Nordstrom, the original and most complete line of lubricated plug valves, are available in steel, semi-steel, stainless steel and special alloys for a complete range of pressures and temperatures. For more information write: Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania.

Available at leading suppliers . . . everywhere.

ROCKWELL-
Nordstrom
VALVES

Lubricant Sealed for Positive Shut-off

40th Year
of lubricated plug valve leadership

Proven Leadership*

*IN 1955 . . . MORE UTILITIES BOUGHT

POWERS American

SERVICE BODIES

THAN ANY OTHER MAKE

HERE'S WHY! Powers-American builds *fine* service bodies . . . and *builds them to last.*

Powers-American can furnish the *just right* body for any service job—standardized for greatest economy . . . modified-standard, to fit individual job needs . . . custom-made, to meet specific operating requirements.

Whether you have one truck or the largest fleet . . . you'll find it worthwhile to get details from Powers-American next time you need service bodies for your operation.

SERIES 350 Bodies have an under-floor winch, a fold-over derrick, and an extension ladder. Compartments are equipped to carry a variety of service tools, parts, and materials.

SERIES 25 Bodies are available in standard models equipped specifically for telephone, electric, gas, or water meter installation and service.

SERIES 44L Bodies have same construction features as Series 44 Bodies described above . . . plus a shelf-equipped superstructure, available with or without roof.

SERIES 450 Bodies, designed for light duty construction and maintenance work, are equipped with a revolving aerial ladder, an underfloor winch, and an easy-to-use derrick.

SERIES 44 Bodies . . . in 75", 90", and 104" lengths . . . are designed for service work in any phase of the utility industry. Equipped with bins, racks, material hooks, and adjustable shelves. Available with optional items to fit individual work needs.

Descriptive literature and price information is yours for the asking

UTILITIES EXPECT MORE FROM POWERS American

McCABE-POWERS

AUTO BODY COMPANY

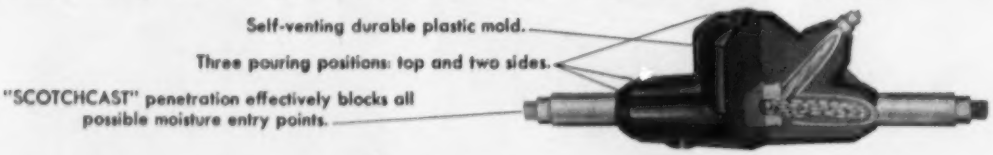
5900 NO. BROADWAY • ST. LOUIS 15, MO. 625 CEDAR ST. • BERKELEY 10, CALIF.

Now anyone can make "Factory Tight" wye or tap splices in the field!

New "SCOTCHCAST" Splicing Kit gives maximum protection against moisture and electrial breakdown . . . solves splicing problems in rectifier ground bed installation

ALL MATERIAL for this revolutionary non-technical method of making wye or tap splice is included in new "SCOTCHCAST" Kit No. 90B1.

This cut-away view shows Factory-Tight "SCOTCHCAST" splice


Self-venting durable plastic mold.
Three pouring positions: top and two sides.
"SCOTCHCAST" penetration effectively blocks all possible moisture entry points.

"SCOTCHCAST" RESIN SPLICE KIT No. 90B1: for use in cathodic protection ground bed splicing, street lighting systems, traffic signal systems, or any place where the very best protection against electrical breakdown or moisture is a must. It offers the following advantages:

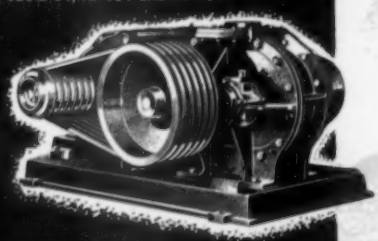
1. Complete moisture protection in weather-exposed locations, direct burial, including underwater use.
2. Thorough protection from mechanical and electrical stresses; uniform protection from splice to splice.
3. Ease and speed of application: an average field splice can be made in 10 minutes . . . even under adverse conditions.

REG. U. S. PAT. OFF.
SCOTCHCAST
BRAND

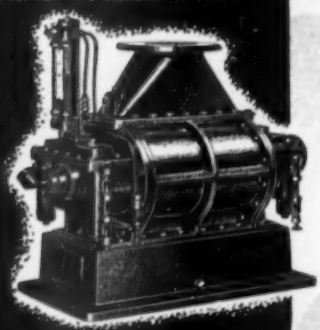
For further information write on your letterhead to 3M Co., St. Paul 6, Minn., Dept. DT-76.

The term "SCOTCHCAST" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

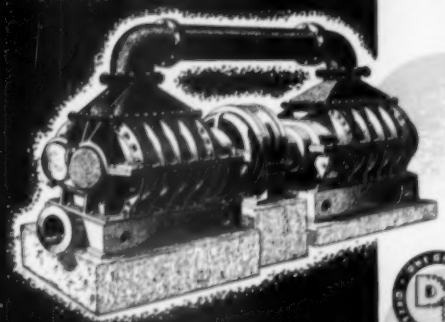
CENTRIFUGAL or Rotary Positive Blowers and Exhausters can move from 5 cfm to 100,000 cfm of air for many diversified needs. For complete details, send for Bulletins 120-B-14, AF-154 and RB-154.



GAS PUMPS can be applied to many industrial uses where from 5 cfm to 50,000 cfm are needed. Send for Bulletins 31-B-17 and 32-33-B-13 for full information.



METERS measure gas up to 1,000,000 cfh or as little as 4,000 cfh with constant accuracy. For specifications and capacity tables, send for your copy of Bulletin M-152.



VACUUM PUMPS with exceptionally low operating cost range in capacity from 500 cfm to 13,000 cfm, and up to 24" Hg vacuum. Complete information in Bulletin 50-B-13.

Production roadblocks avoided by ingenious use of air or gas

Alert industrial engineers and designers are finding new ways to put gas and air to work more effectively. They take delays out of industrial processing and improve quality. They add new utility to devices and appliances for commercial and home use.

...in many different applications

they are utilizing the many advantages of Roots-Connersville equipment. They move large or small volumes of air and gas with Blowers, Exhausters and Gas Pumps ... produce vacuums ... meter gas for proportioning or other measuring needs ... protect plants against fire and explosion with Inert Gas Generators. Solutions of specific problems are often solved faster and better when

...assisted by Roots-Connersville ideas

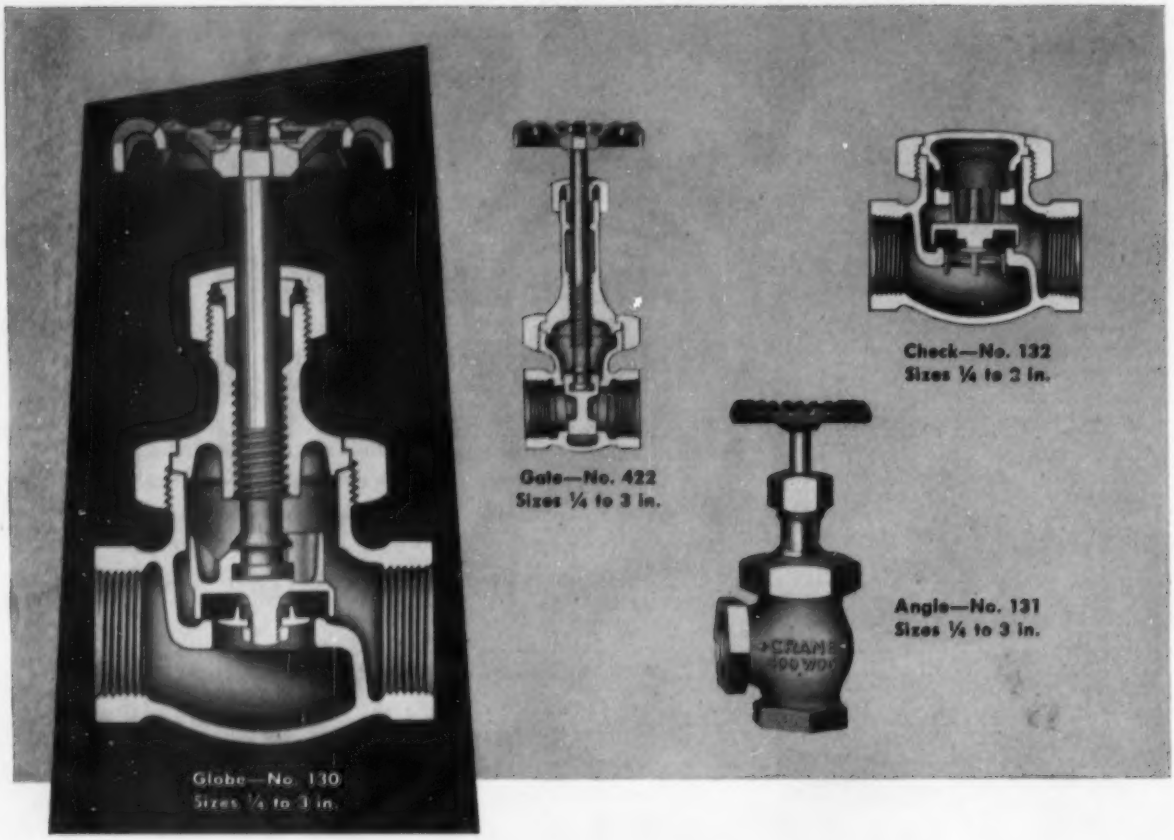
These are the result of more than 100 years of knowledge and are available to any user of gas or air, or equipment builders who need them. If you have a product or a process which might be improved by our mutual effort, we'll gladly work with you.

Just address:

Product Development Manager, Roots-Connersville Blower Division
656 Illinois Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.



Whether liquid or gaseous— handling LP-gas is safer with CRANE Bronze Valves

With Crane Bronze Valves on your storage tanks, tank trucks, and in service piping—you'll reduce the hazards of handling LP-gases to a new low.

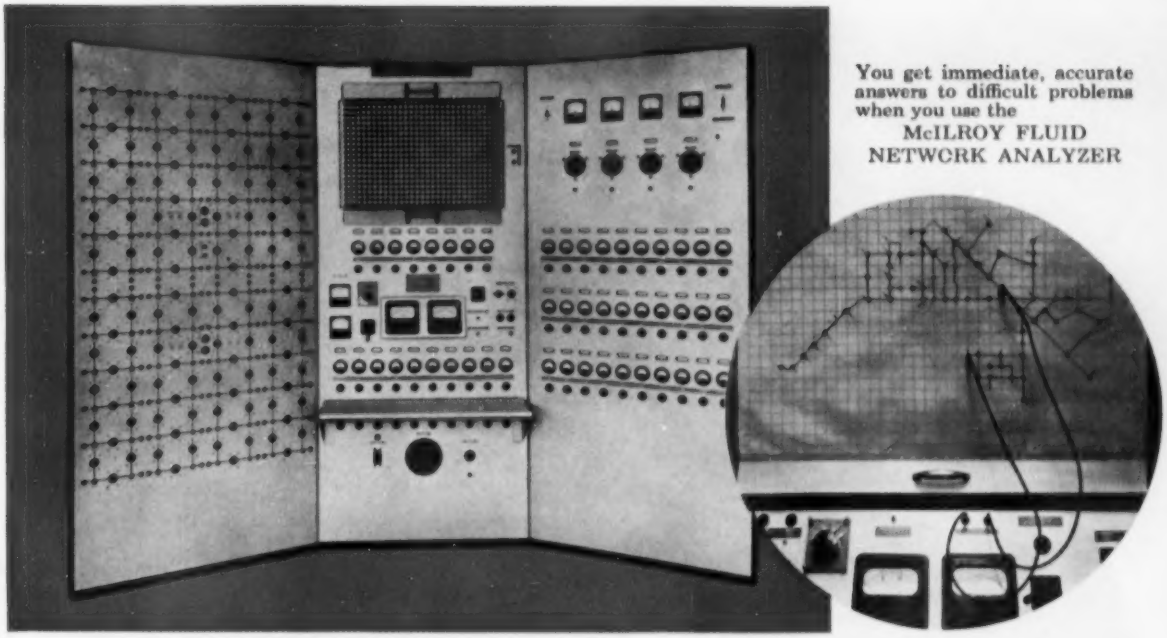
Here are valves developed specifically for handling all LP-gases, whether in the liquid or gaseous state. The Crane globe, angle and check valves, for example, have a specially formulated composition disc that seats with absolute tightness, yet withstands hardest wear. And for double insurance against any internal leakage, this special Crane No. 6 disc is permanently cemented into the disc holder.

You'll find the complete line of these Crane Bronze Valves at your local Crane outlet, including globe, angle, gate and check patterns. Each pattern is designed and constructed to help you do a better, safer job of LP-gas handling. See your local Crane Representative today for details, or write to address below.

CRANE VALVES & FITTINGS

PIPE • KITCHENS • PLUMBING • HEATING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers in All Areas



You get immediate, accurate answers to difficult problems when you use the McILROY FLUID NETWORK ANALYZER

SIMULATE YOUR SYSTEM with the McILROY FLUID NETWORK ANALYZER

Loads represented fully automatically by constant-current electronic circuits.

Do you realize that hidden weaknesses in your plans can be quickly detected when tested on the McIlroy . . . that alternate plans can be quickly devised and a successful solution developed all in a few hours?

"LOOK WHAT HAPPENED TO OUR PLANS WHEN TESTED ON OUR McILROY"

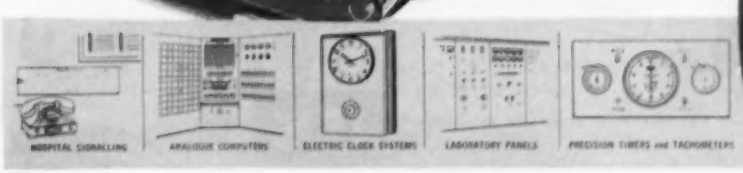
"We found a section of proposed 12-inch main would not improve pressures as anticipated; would have wasted thousands of dollars. A proposed source would improve conditions over too small an area. New load growth would cancel any benefits of our plan in only three years.

"So, after testing 15 alternate plans, we selected a final plan which gave us not only the proper margin of safety for growth but assured maximum benefit for every dollar invested.

"AND WHAT'S MORE, testing the 15 alternate plans and developing our final plan took only 18 hours on the McIlroy Analyzer."

SEND FOR BULLETIN #183

STANDARD ELECTRIC TIME COMPANY
125 Logan Street,
Springfield 2, Massachusetts



THE KEY PART

Just as the structure of this puzzle depends on *one* essential part, so can the IBM punched card serve as the key to *all* data processing for Public Utilities.

Making maximum use of your IBM punched card equipment not only gives you maximum efficiency *now*, it also helps prepare you for progress in electronic data processing *tomorrow!*

If your equipment is currently at work on less than 40 applications, there is room for profitable improvement. For a fresh look at *your* data processing picture, call your local IBM representative or send for these free illustrated folders—today! Write: PUBLIC UTILITIES DEPARTMENT A56, International Business Machines Corporation, 590 Madison Avenue, New York 22, N.Y.

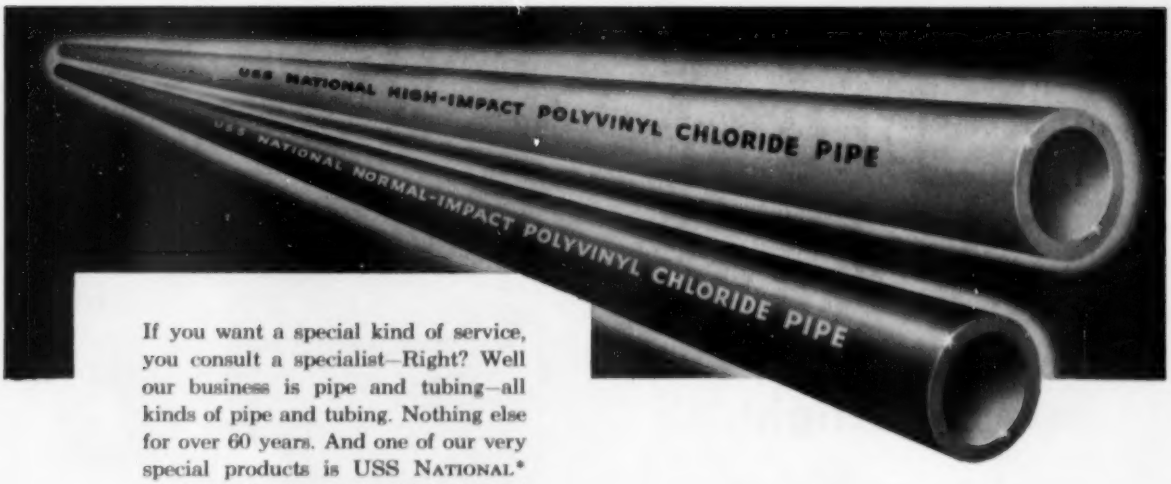
"General Accounting"

"Customer Accounting"

"Electronic Data Processing"

DATA PROCESSING · ELECTRIC TYPEWRITERS · TIME EQUIPMENT · MILITARY PRODUCTS

IBM DATA PROCESSING



If you want a special kind of service, you consult a specialist—Right? Well our business is pipe and tubing—all kinds of pipe and tubing. Nothing else for over 60 years. And one of our very special products is USS NATIONAL* PVC Plastic Pipe. "PVC" is Polyvinyl Chloride, the "stainless" of plastic pipe materials. It's hard, tough and rigid; immune to acids, alkalis, salts, alcohols, fungi, bacterial action and soils, as well as a multitude of chemicals. And it won't corrode.

Versatile? NATIONAL PVC Plastic Pipe will transport just about anything —wet or dry natural gas, oil, brine, acids, chemicals, etc. What's more, it can be coupled by solvent cementing, threading, heat welding, or adhesives. And NATIONAL PVC is rigid enough to be used in overhead installations with pipe supports.

And is it fast and easy to install! A 20-foot length of 2-inch Schedule 40 pipe weighs less than 13 lbs. In Texas, recently, a 2,800-foot gathering line was laid in just *1¾ hours!* How's that for cutting man-hours to the bone?

Two types of NATIONAL PVC Plastic Pipe are available in sizes ½" to 6" inclusive, and in Schedules 40 and 80.

1. **NORMAL-IMPACT**—for installations requiring the highest chemical resistance attainable, together with high strength and excellent creep resistance.
2. **HIGH-IMPACT**—for installations requiring excellent chemical resistance and a high degree of toughness even at low temperatures.

For the plastic pipe that has everything you want in gas service lines, next time try USS NATIONAL PVC Plastic Pipe.

**Trademark*

When you want

THE TOUGHEST, MOST VERSATILE PLASTIC PIPE—

look to the leader...

NATIONAL TUBE

For complete details on NATIONAL PVC *Plastic Pipe, send for this free, illustrated booklet. Write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Mention Bulletin 24.*

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

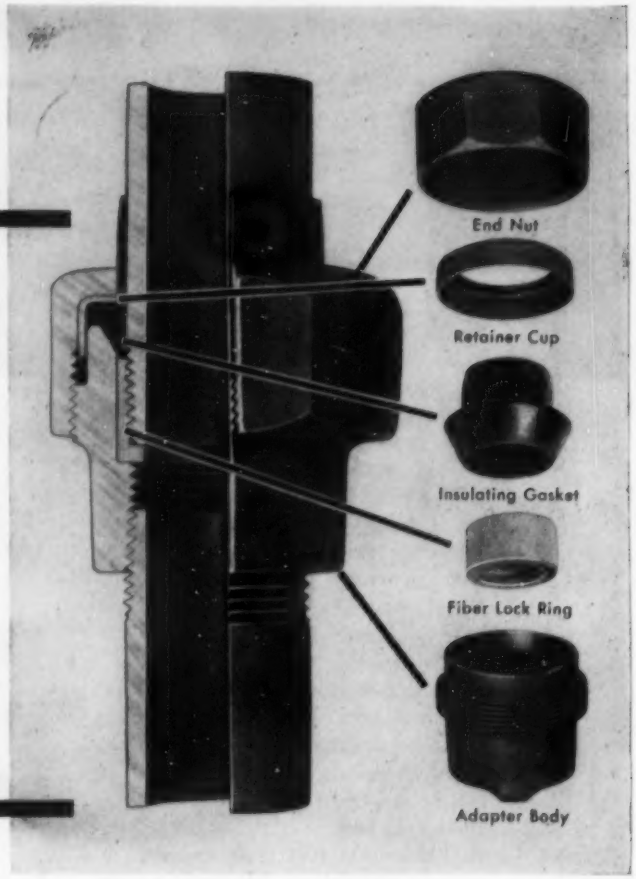
NATIONAL *plastic* PIPE

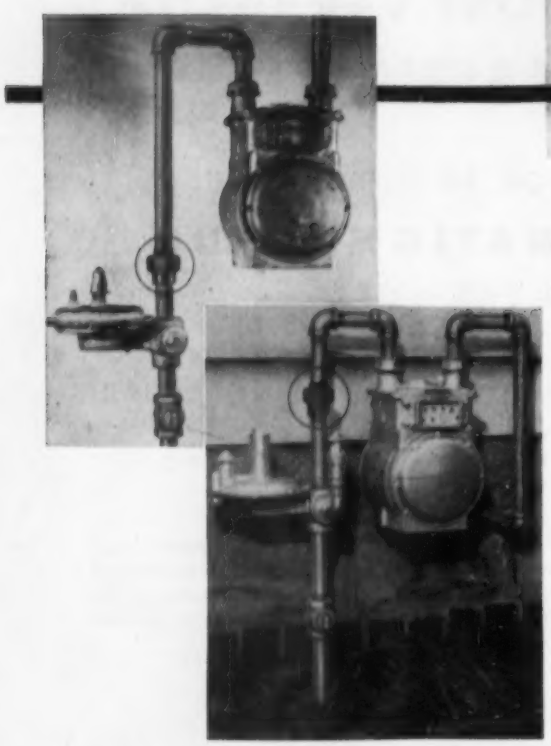
UNITED STATES STEEL

INSULOK

ADAPTER

seals gastight, resists pull-out, blocks current flow!





Since its introduction, the Dresser Style 90 Insulok* Adapter has become accepted throughout the gas industry for setting meters and regulators—inside the basement and out!

Installation is fast, foolproof, trouble-free. Positive sealing is maintained by the rubber gasket *built in*. To meet the unusual strains of basement hookups, the fitting design provides extra safety and resistance to pull-out. Rigidity for good meter settings is assured. Damaging currents between main and house are blocked effectively.

Insulok fittings are available for a variety of applications, in ¾", 1", and 1¼" sizes, in both male and female types. Wrench-installed like all other Dresser products, they go on quickly and easily, provide swift entrance into lines for servicing of meters and regulators, assure leakproof performance for life. Your Dresser Sales Engineer will give you full details.

*Insulok is a registered trade-mark.

DRESSER®

ONE OF THE DRESSER INDUSTRIES

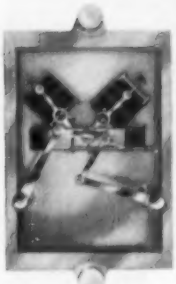
FITTING PARTNER FOR THE GAS INDUSTRY

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. Warehouses: 1121 Rothwell St., Houston; 101 S. Airport Blvd., S. San Francisco. Sales Offices also in: New York, Philadelphia, Chicago, Atlanta, Denver. In Canada: Toronto, Calgary.

IF YOU HAVE CLEAN GAS...

You save twice with SUPERIOR'S OPEN-TOP METER

1. LOWER FIRST COSTS
2. LOWER REPAIR COSTS



Superior's Open-Top Meter

Valves and moving parts immediately accessible under cover. Sizes 80 to 425 cfh.

Superior's Closed-Top Meter

Recommended for manufactured and mixed gas, and for larger sizes. Capacities 150 to 7500 cfh.

Send for new Bulletin No. 1100

Here is a meter that offers a genuine two-fold saving. Today's clean natural gas, together with many refinements in Superior's design, now make it possible to omit one piece of metal and eliminate a major soldering operation. This means lower first cost . . . with more savings for you every time you open the meter in the decades ahead.

The Superior open-top design replaces the time-honored soldered back plate with a new open-bridge construction. Valves and all above-table working mechanisms are easily accessible as soon as the top is removed. For proving and valve adjustments, a hand-hole plate in the top cover is available. A special stuffing box on the index shaft prevents escape of gas should index glass be broken. Top edges of the main case are extra wide so that the cover can be made smaller. This makes it easier to do a surer, safer soldering job, particularly around the pipes.

Write today for full details.

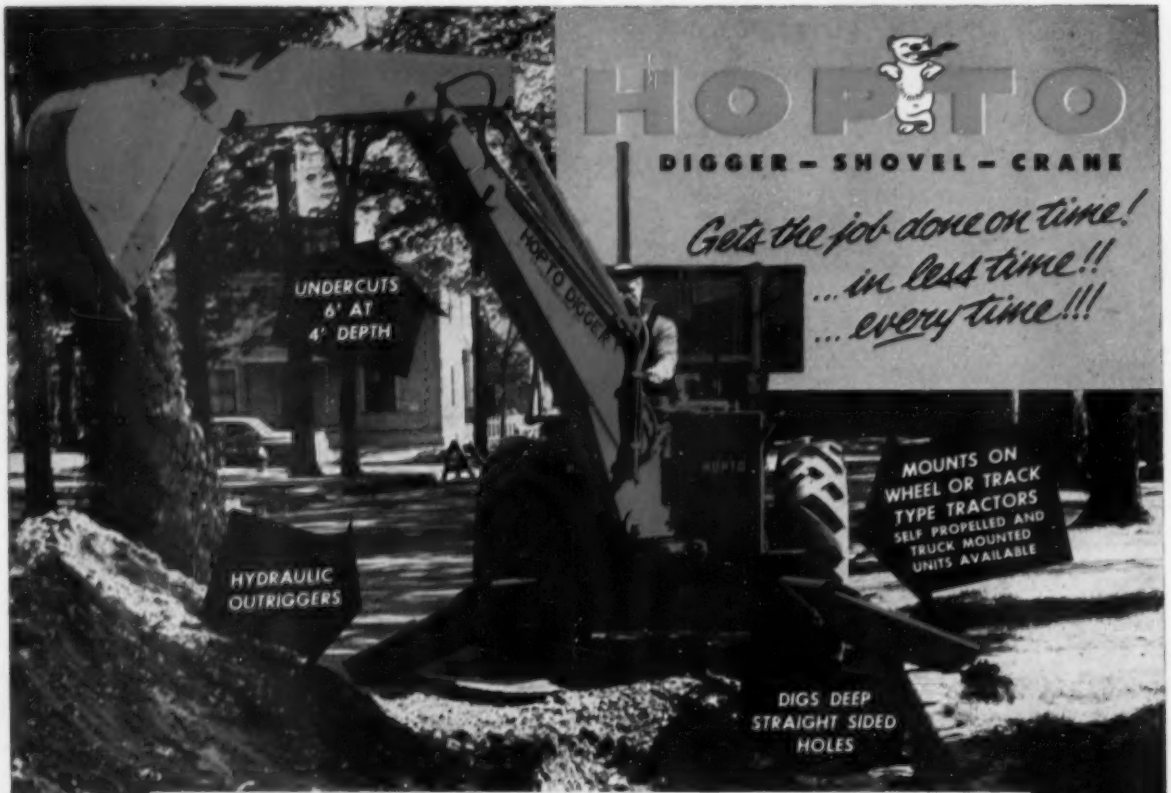
superior
GAS METERS

SUPERIOR METER COMPANY, INC.
19 West 50th St., New York 20, N. Y.

A SUBSIDIARY OF NEPTUNE METER COMPANY

SALES OFFICES: Atlanta, Boston, Chicago, Dallas, Denver, Los Angeles, Louisville, No. Kansas City, Philadelphia, Portland, Ore., San Francisco (Millbrae)

SU-6


HOPTO
DIGGER – SHOVEL – CRANE
Gets the job done on time!
... in less time!!
... every time!!!
UNDERCUTS 6' AT 4' DEPTH
HOPTO DIGGER
MOUNTS ON WHEEL OR TRACK TYPE TRACTORS
SELF PROPELLED AND TRUCK MOUNTED UNITS AVAILABLE
HYDRAULIC OUTRIGGERS
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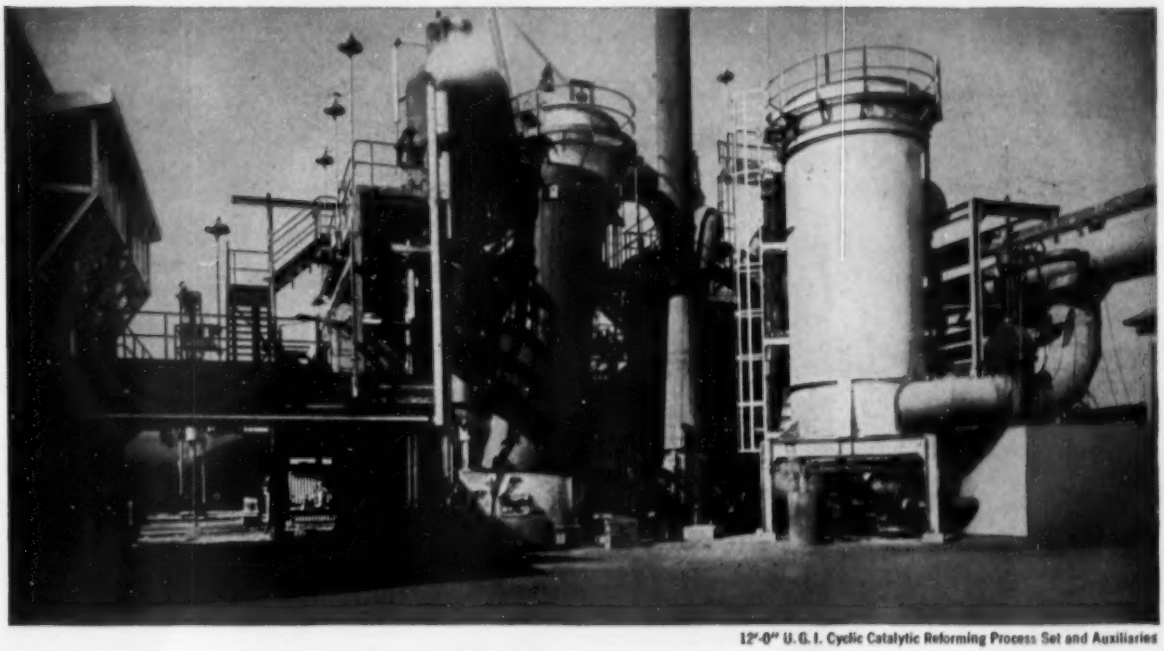

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LIST OF INSTALLATIONS

COMPANY	LOCATION	NUMBER OF SETS	
Allentown-Bethlehem Gas Company	Bethlehem, Pa.	First	1
Citizens Gas and Coke Utility	Indianapolis, Ind.	First	1
Consumers Gas Company	Reading, Pa.	First	1
The Harrisburg Gas Company	Steelton, Pa.	First	1
Philadelphia Electric Company	West Conshohocken, Pa.	First	1
The Philadelphia Gas Works Company	Philadelphia, Pa.	First	1
	Philadelphia, Pa.	Second	1
	Philadelphia, Pa.	Third	1
	Philadelphia, Pa.	Fourth	1
Public Service Electric and Gas Company	Paterson, N.J.	First	1
	Harrison, N.J.	Second	2
	Jersey City, N.J.	Third	1
	Harrison, N.J.	Fourth	1
Rochester Gas and Electric Corp.	Rochester, N.Y.	First	1
	Rochester, N.Y.	Second	1
	TOTAL		16

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GAS
JULY 1956

Peoples Gas improves efficiency of telephone order department

GAS exclusive

By JACK H. CORNELIUS
Assistant Superintendent • Customers Order Department
The Peoples Gas Light & Coke Co., Chicago

Fig. 1. An overall view of the telephone order section at Peoples Gas Light & Coke Co., Chicago. The head of the fourth line of desks and conveyor can be seen running at right angles to the left hand line of desks.

IMPROVED morale and increased efficiency were the benefits derived from a modernization program that relocated and completely changed the physical setup of the telephone order section five years ago at Peoples Gas Light and Coke Co., Chicago

Before getting into the history of the development of the telephone order section at Peoples Gas, let's outline briefly just what the organization is and a little information about how it operates.

The customers order department is part of the customer relations division and the telephone order section is controlled by that department. We receive calls from customers, under normal conditions, from 8:15 a. m. to 5 p. m., six days a week (excepting Sundays and holidays). Unless the incoming calls are too heavy, calls from customers, received outside these hours, are screened by the PBX switchboard operators and any customer with an emergency order (report of gas leak, no heat, no hot water) is connected directly with the appropriate service department shop dispatcher (we have three such district shops, north, central and south, serving the city). If incoming traffic is extremely heavy, the cen-

Fig. 2. The telephone service clerk's desk is shown here. Note the lock on the lower drawer which gives the order taker a place to keep personal belongings. Top drawer is compartmented into a forms file.

tralized order taking facilities are kept open to handle such traffic.

Three classifications

The telephone order section activities are directed by a supervisor and an assistant supervisor. We have three additional job classifications in the section: (1) the telephone service clerk, who answers calls from customers and initiates orders to be executed; (2) the senior telephone service clerk, charged with responsibilities of answering difficult questions the order taker is unable to handle, giving approval for special service to be rendered, monitoring, and training (constantly) the order takers, and (3) the teletype operator, who reviews orders issued and routes them to departments which will complete the work, who keeps various order counts, and who operates the teletype machines connecting us with each of the three district shops. We maintain a force of order takers large enough to take care of a normal volume of calls and have trained other clerks in and outside our department to help out in an emergency. We utilize the regular order takers during any slack time (usually in the afternoon) to make calls to customers requesting appointments for our servicemen to complete work on the customers premises, to settle gas bill inquiries, and other miscellaneous duties.

Now let's outline some of the Peoples Gas' recent history. A "modern" telephone order-taking installation had been completed in 1937, and was considered to be an excellent example of a well-planned setup. However, by 1948 it was apparent improvements had to be made to adequately handle customer telephone contacts and to keep our employees satisfied with their working conditions.

Recommendations

A study of existing facilities was made and it revealed the following:

As with so many similar installations, our telephone service clerks had been crowded together on both sides of three long tables, each with a conveyor belt in the center to take the written orders to a gathering conveyor belt which in turn delivered the orders to a reviewer. Because of the lack of space, there was too little writing surface, there was insufficient room for storing of reference books, stationery and other materials used by the clerks; the noise level was high; there was no room for needed expansion. Also, the employees were not happy with the remote monitoring system which was in use.

The results of the study convinced management that a move must be made, and improvements incorporated into a new setup. To implement the planning, two men, the department superintendent and an executive office staff assistant, were sent on a tour of five cities where modern telephone order taking facilities had been recently installed. Their reports were studied, and with the help of our own methods and routines department, recommendations for an improved setup were formulated and presented to the division vice president. The recommendations were essentially these:

1. That sufficient space be assigned to allow the use of individual desks. It was felt this was the only answer to problems of sufficient work space, storage of reference books, stationery and work materials, overcrowding, and reduction of noise level to the individual telephone service clerk. It was also felt each clerk would enjoy having a desk of his own with a private drawer where he could lock up his personal effects.

2. That the conveyor system should deliver the written orders to a centralized gathering and reviewing point and that the teletype machines also be installed at this point. This proposal would insure fast, efficient handling of all orders and quick dispatching of emergency orders.

3. That the remote monitoring system be replaced with an "out in the open" monitoring setup. It was felt the "sting" of the monitoring function would be removed if the order takers knew when they were subject to monitoring.

4. That the senior telephone service clerks be provided desks and assigned to help eight order takers, and that two-way telephone communication be provided between each of the eight order takers and the senior clerk. Under the old setup, the senior clerks personally came to the aid of an order taker when he raised his hand, the signal for requesting help. The recommendation was intended to promote a close working relationship between specific order takers and a senior clerk, and to give the senior clerk the responsibility for the training, behavior and production of a small group of order takers.

5. That a separate "direct to the order taker" service number *not* be used; that all incoming calls should continue to be routed through the central PBX switchboard. There were many pros and cons involved in discussing this point.

FOR adoption of the separate direct service number:

a. Reduction in labor cost at the switchboard because fewer operators would be needed to handle the reduced volume of calls.

b. The customer would be connected directly with the order taker; no intervening party.

c. Other than customer telephone contacts could be handled normally when an emergency results in a flood of calls for service through the switchboard.

AGAINST adoption of the separate direct service number:

a. Difficulties inherent in acquainting the public with the new system.

b. Loss of "personal touch" of the switchboard operator saying, "Good morning, Peoples Gas," and, when the lines are busy, having the operator periodically monitor the held call.

c. Lack of flexibility in handling peaks. In addition to our senior telephone service clerks and other clerks in our own department being qualified to handle customer calls in an emergency, we have trained people in the credit and collection and customers departments to help us. When such an occasion arises, the switchboard supervisor is notified of the extra extensions to be used and apportions them among the operators with instructions to keep these lines busy. We can gain as many as 24 additional order takers if needed. With the direct separate service number, extra lines (inactive most of the time) to handle peak loads would be a constant extra cost. Also, it would be awkward to have people leaving departments scattered throughout the building to report in person to the telephone order section rather than having calls routed to them. This loss of flexibility was an extremely important consideration in deciding to retain the central switchboard system.

These recommendations were adopted in principle and a working plan was evolved.

Equipment ordered

A space 140 ft x 21 ft was assigned for use. The floor plan as finally worked out called for three rows of 18 desks each along the length of the space. Beside each row of desks stretched a conveyor assembly *(Fig. 1)*. At the head of each conveyor was a receiving and reviewing desk. The three teletype machines (one for each of the three district shops) were placed within reach of the reviewing desks. The desks were spaced 3 ft 6 in. apart and aisles of 4 ft and 5 ft were established between

Telephone order department . . . Incoming calls are routed through the PBX switchboard

rows. The 9th and 18th desks in each row were wired for the senior telephone service clerks.

Several models of desks and chairs were brought in for testing and the telephone service clerks' opinions were requested. A wooden 30- x 45-in. single pedestal light finish desk and a comfortable green upholstered posture chair were selected.

Layout work and selection of furniture were completed, bids were accepted for the three conveyor installations, a decision made, and fabrication and installation of the conveyors completed.

When we had decided to retain our "all purpose" telephone number and route all incoming telephone calls through the PBX switchboard, the Illinois Bell Telephone Co. advisory and engineering facilities were used to the maximum extent and a telephone setup was designed to meet our desires and needs. What the telephone people call their No. 4 order turret system was installed. A 6- x 4½- x 4½-in. (width, height and depth) cabinet on each desk contains the system's key equipment *(Fig. 2)*. There are four keys mounted in a horizontal line and all operate with a downward motion. The left-hand key is pushed down to complete the circuit when a customer's call is indicated by a buzz in the headset and by illumination of a white light attached to the cabinet. The call can be held by further depressing the key. The left middle key is used for outgoing calls only over a dial terminal (a dial is mounted on each desk). The right middle key is used to complete the circuit when an overflow condition exists during busy periods. A green light on each desk of a section (nine desks) plus the sounding of an audible buzzer alerts the order taker to the overflow condition. When the circuit is completed (by depressing the right middle key) the light is put out, and the buzzer is silenced. Depressing this key all the way down will "hold" the call. The right hand key is depressed to "busy out" (cause the availability light at the switchboard to be cut out). It may also be used, when fully depressed, to call the senior clerks. A buzzer sounds and the position light at the monitor cabinet flashes as the key is worked.

In order that the work load be evenly

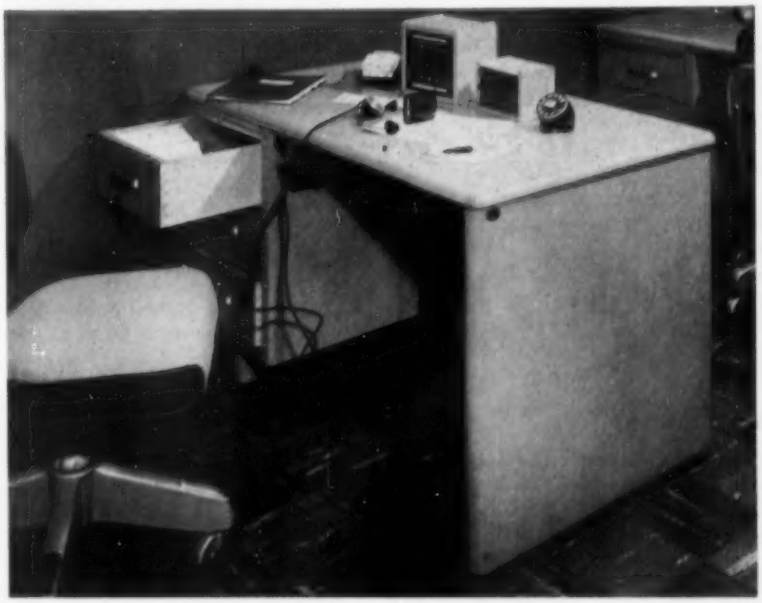


Fig. 3. This is the senior telephone clerk's desk. Note the extra telephone key cabinet (largest of the two) through which the monitoring is conducted. Below the two sets of jacks can be seen the key which controls the circuit allowing the senior clerk to talk with the order taker.

Telephone order department...Special "call allotter" system distributes work evenly

distributed to each order taker the telephone company engineers devised a "call allotter" system designed to make sure every clerk available at a given time to take a call receives one before any other clerk gets a second call.

Flexible system

To satisfy our desires for an out-in-the-open monitoring system, and for a two-way line of communication between the order taker and his senior telephone service clerk, the engineers designed a very flexible system. On each of the senior clerks' desks is, in addition to the No. 4 order turret, a cabinet housing the No. 101 key equipment *(Fig. 3)*. This cabinet is 7½ in. wide, 7½ in. high and 6½ in. deep. There are four keys mounted horizontally, movable with both an up and down motion to enable the contacting of each of the eight positions in the group. With this equipment, monitoring of each of the eight positions can be accomplished. If the senior clerk desires to talk with an order taker or if the order taker flashes the senior clerk asking him to come on the line, a separate key at the senior clerk's desk will operate the intercommunication system. The senior clerk can not only listen (undetected), but can also initiate a conversation with any of his order takers, or can answer a call when his advice is needed without leaving his desk. This setup have proven to be extremely flexible and of great value.

Each desk has a double set of plug-in jacks, one to be used when training new people or letting visitors listen in, and the senior clerk's desk has an extra double set of jacks to be used in the same way with the supervisory communication system. All personnel are furnished with lightweight headsets.

More efficient

The newly designed and installed system went into operation in January 1950 and operating experience has proven the care taken in investigation and design has more than paid off. An emergency arose shortly after the new system began operating. With the same number of people working as we had during similar emergencies while using the old setup, 35% more customer contacts were handled than had ever been received before. Morale had been boosted tremendously with the move to new quarters and the supplying of new equipment.

In the intervening years, refinements have been made in the telephone order section equipment and space. Another row of 18 desks *(Fig. 4)* has been installed to meet the expanding need for telephone order taking facilities. We were able to dump the work carried on this fourth conveyor into one of the three conveyors originally installed, thus *not* creating a fourth receiving and reviewing point.

Recorder added

We established, during remodeling two years ago, a conference room where we hold training sessions. As part of our training program, we installed a "commercial" quality tape recording hookup to be used (with the beep tone) in recording clerk-customer conversations and to double as a play back machine. Oddly enough, we have little reaction from the public over the use of the beep signal when a conversation is being recorded. One amusing incident pointed out very vividly, however, that the people do know what the beep tone means. A man called to ask why we had not executed an order he had previously placed with us. Our clerk checked and reported to the customer he could find no indication of our having received such an order. The customer came right back with "You sure as heck ought to be able to locate it —you recorded it." Sure enough, on replaying the tape prepared the day in question, we discovered the order had been received.

In addition to discussion sessions and recorder play back meetings, the monitoring system is fully utilized in the training of our order takers and other clerks in the department. Each clerk sits with his or her senior telephone service clerk to listen to the other people in the group and also, over a period of time, sits with every other senior clerk listening to every order taker in the section. Clerks from files called frequently for information also sit in on customer-clerk conversations so they can better understand why so many questions are asked by the telephone clerks.

We also improved the already fine physical surroundings by replacing the ceiling with a better acoustical type tile and by recessing the fluorescent lighting fixtures. "Muzak" was contracted for (volume controlled at the supervisor's desk) and an air conditioning system was installed.

New telephones

Many customers insist on talking to the "manager." To accommodate these people, three cradle type phones were installed, one at the senior clerk's desk in the middle of each of the three original rows. Each instrument can pick up a call to any one of the three positions. The phones were installed this way so that a senior clerk at any one of the desks can answer a call on any line without leaving his desk. Calls placed on these sets are answered with the phrase "manager's office."

An improvement in performance and appearance, and a reduction in office noise level was accomplished by changing to the new Model 28 teletype machine. We also had the teletype people give us some flexibility in case of a machine breakdown by enabling us to use one of the two working machines (by means of a "patching" circuit) to send to a location other than that normally assigned. Any one of the three sending machines in our central main office location can, by using the circuits provided, send to any one of the three outlying receiving locations. We have also mounted telephones on each of our sending machines so the teletype operators can call, or receive calls from, the outlying location dispatchers when any question arises or when machine trouble occurs.

We have the problem of communicating quickly with each order taker should an emergency arise, or if we are trying to locate an order taker who was just talking with a customer (who is back on the line) and they were accidentally disconnected. We also have occasion to issue basic instructions. In an attempt to find a satisfactory solution to this problem, we gave consideration to:

1. A blackboard.

This idea was discarded because it would mean printing in very large letters so the people in the back of the room (140 ft away) could see, thereby limiting

Fig. 4. This is the fourth line of order taking positions. In the left foreground are the completed file cabinets, and beyond the pillars is the meter record file.

the length of the message; and because it was a slow process and raised the additional problem of getting everybody's attention without creating too much distraction.

2. A projector and screen.

A demonstration revealed the same basic objections as against the blackboard. We found a person walking down the aisle could quickly locate the clerk just cut off from a customer, and in an emergency, each senior clerk can quickly notify each of his people. Basic instructions are reproduced and a copy given to each clerk so that he will have a permanent reference.

The result of our investigation of this problem is communications was to retain our present system as outlined in point 2.

Another tool that had been developed to help the telephone service clerk do an efficient job was a "phrase book" in which we outlined for each type of customer request a suggested sequence of questioning and exact wording to use when asking questions. It is, of course, impossible to always follow the phrases. However, this tool has proven very effective in helping our people get and keep control of a conversation and thereby speed the completion of a customer contact.

"One-stop" operation

Ours is a "one stop" operation, that is, each clerk answering calls from customers is trained to handle any question or request for service, whether it be about bills, piping, leaks, meter reading, collection activity, or schedules. The senior clerks are always on hand as the "last word experts" to handle the special cases that cause the clerks difficulty. This "back-up" job by the senior clerks is an important part of their duties, and the job has been made much easier due to the two-way communications system between the senior clerks and their order takers.

Our order taking facilities are located adjacent to the major customer files: (1) the meter record file, where all turn-on and turn-off gas orders are processed and controlled, and (2) the completed file, where all completed reports of visits to customers' premises to render service are filed. Only a few steps separate the girls at the reviewing desks from the girl who distributes turn-on and turn-off orders throughout the meter record file. This makes a very efficient time- and effort-saving arrangement.

Having the order receiving and reviewing girls near the completed file allows us to give the district shop dispatchers up-to-date information in cases where the customer indicates we have made several recent visits to his or her premises and still have not remedied the trouble. Before teletyping the new request for service, the reviewer checks for previously completed tickets and sends a digest of such reports to the ship dispatcher with the current request.

This, then, is the thought behind, the development of, and the results experienced from, the new order-taking section at Peoples Gas. We are proud of our setup and have proven conclusively, in our own minds, that it is worthwhile to provide workers with good working conditions and the best of equipment. It pays big dividends! ■

Australia gasifies its brown coal

American companies and research groups, including major pipelines, have been experimenting with the production of pipeline gas from various coals. Here is a report from Australia where a plant will soon go into production to produce coal gas from lignitic, unconsolidated brown coal.

By H. BOWDEN FLETCHER, Australian Correspondent • UTPS

VICTORIA, the most densely populated state of Australia, has not discovered a substantial deposit of high-grade gas coal. Gas-making coal supplies have been brought from the N S W black coal fields by sea transport.

Strikes in mines, on the water front, in the ships, etc., together with delays due to bad weather, have kept the state in a perpetual condition of gas shortage or fear of gas shortage. Although it has no black gas-coal, the state is rich in deposits of brown coal with seams ranging from 20 or 30 ft to ones of 1000 ft thick, and over. The greatest of these are in the Latrobe Valley about 90 miles from the capital city of Melbourne. The Gas & Fuel Corp. of Victoria has been forced to investigate the possibility of using these huge deposits to assure the future supplies of gas.

The corporation sent two of its senior officers, Dr. R. S. Andrews and R. J. Bennie, to Germany to investigate the Lurgi process of producing gas from brown coal deposits in that country. They decided that the system was the one to be used in Australia. Then, two German experts, Dr. Danulat and Dr. Bruggemann, came out to Australia and, after inspecting the deposits of brown coal, supported the decision of the two Australians.

The problems associated with brown coal for gas making were solved in Germany and the Lurgi system has been successfully operating in that country for some years. The corporation ordered its equipment from Germany and decided to construct on a 384-acre site adjoining the new open cut being developed by the State Electricity Commission of Victoria, at Morwell. German experts have come to Australia to supervise its erection and the operation of the plant in its early years.

Brown coal cannot be successfully treated by the carbonization method of producing gas because: (1) the gas yield is poor, (2) its heating value is low, and (3) the produced gas contains 30% of inert carbon dioxide.

The char which remains after carbonization is highly reactive and lights spontaneously, at the least provocation, making it dangerous and impossible to market.

In the middle thirties, Professor Drawe of Charlottenburg University

Above: Framework goes up for the boiler house (chimney), generator house, and wash towers at the Morwell, Australia, gas-making project. Conveyor galleries are shown in position.

assisted by Dr. Danulat, from the Lurgi Co., sought an alternative chemical process and finally gasified brown coal from briquets, in a mixture of steam and oxygen, under a pressure of 300 psig.

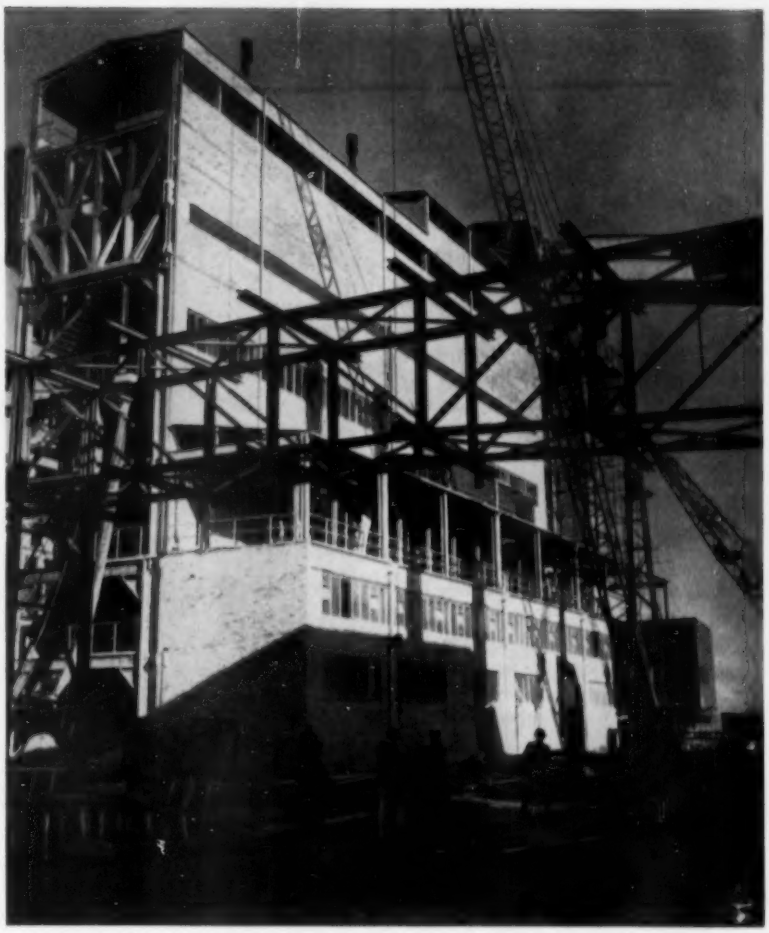
The Lurgi Co. took over the process and built two plants in Germany and Poland, both of which are now behind the Iron Curtain. The process is known commercially as the Lurgi process. It will gasify all soft coals, which form the bulk of the world's untapped reserves.

For instance, the Morwell field is estimated to contain 27,000 million tons in seams ranging from 100 to 1000 ft in thickness and located beneath shallow overburden, which makes open cut mining economical.

When the plant is opened, the initial output will be 15 MMcf/d and it will be produced in six bottle-shaped generators at a pressure of 400 psig, high enough to transmit it, without further compression, through 80 miles of 18-in. OD, welded steel pipe to the control station at Dandenong.

There, the pressure will be reduced to 25 psig and the gas will flow to Port Melbourne and Highett works to be blended with waste oil refinery gas, brought from the Standard Vacuum Altona plant through a 7-mi pipeline.

The addition of the oil gases permits the blended product to be distributed through the existing mains and custo-



The generator house is the heart of the Lurgi process. Here, brown coal briquets are gasified with oxygen and superheated steam at high pressure.

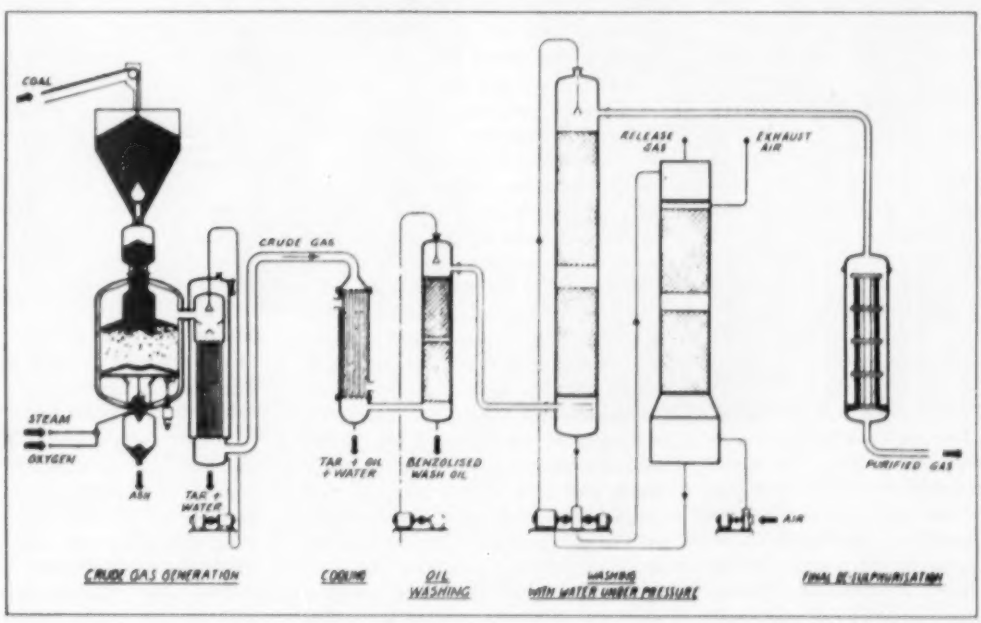


Fig. 1. Flow diagram of the Lurgi process that is being used in Australia to produce coal gas from brown coal.

mer services. About 1.5 MMcf/d of oil gas will be used.

The completion of the Altona Oil Refinery in time to permit use of its waste gases has actually saved the Gas & Fuel Corp. considerable expense as the brown coal gas burns at a different combustion rate than that for the existing black coal gas and, without the oil gas blending, it would have been necessary to visit every customer and alter the air intake on every gas appliance. The oil gas will have about three times as much heat content as that now being piped to customers; therefore, by mixing it with the brown coal gas, the quality of the sendout gas will be the same as now being used.

Brown coal gas produced under high pressure has no smell. For obvious safety reasons, a synthetic with the familiar gas odor must be added to the gas before it enters the pipelines for distribution.

The brown coal for the Morwell project will be mined by the open-cut method and converted into briquets by the State Electricity Commission, which uses briquets in its own power houses, and it will be moved from briquet factories to the gas plant by belt conveyors.

In passing, it should be mentioned that the State Electricity Commission mines the coal, makes it into briquets and transports the briquets to Melbourne entirely by mechanical means — from removing the overburden to delivery of the briquets to the boilers of power houses located in Melbourne. This permits costs to be kept to an absolute minimum.

Fig. 1 shows a flow diagram of the Lurgi process as applied at the Morwell plant. The solid fuel is charged from a storage bunker through the coal lock chamber into a pressure generator, where it is completely gasified at a pressure of 300 psig, by a continuous stream of oxygen and superheated steam. The ash is removed from the generator by means of a rotary grate into the lock chamber for ash, from where it is finally discharged. The charging of fuel and the extraction of ash from the lock chamber are intermittent procedures, effected by operating alternately two high pressure valves. The raw gas leaving the generator at the top is immediately scrubbed, and precooled in a spray cooler connected with the waste heat boiler.

The gas is further cooled and freed from condensable liquid products in a system of tubular coolers. The benzene in the cooled gas is subsequently removed in an oil washer and recovered from the wash oil by stripping with steam at atmospheric pressure.

The benzene-free gas, with a calorific value of approximately 320 Btu/cu ft, still contains gaseous impurities—such as carbon dioxide and hydrogen sulfide, which are washed out with water under pressure. A pump conveys the water to the top of the washing tower, and most of the carbon dioxide and practically all the hydrogen sulfide from the counter-streaming gas are absorbed by the water before it leaves the tower at the bottom. The water then passes through an expansion turbine where the dissolved gas is released. Final traces of the dissolved gas are removed from the water in the aeration tower and it is then recirculated through the pump to the pressure washer. The gas dissolved from the washing tower, which has a calorific value of approximately 60 Btu/cu ft, together with the crude gas released when operating the coal lock chamber, is used for superheating the steam required for gasification.

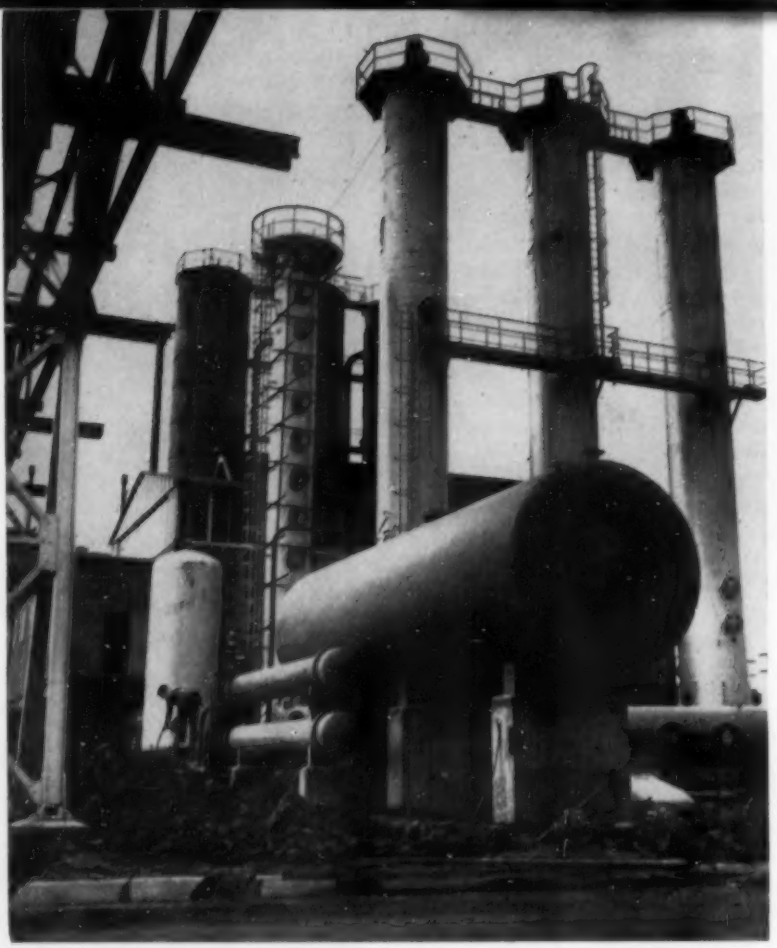
The gas leaving the water wash is freed from traces of hydrogen sulfide by passing it through iron-oxide boxes under pressure.

The purified gas then passes to the dehydration plant where its moisture content is reduced by counter-current washing with triethylene glycol. This dehydration is necessary to prevent condensation and consequent corrosion in the underground pipelines.

The dried gas passes through an odorizing unit where volatile organic sulfides are added to increase the odor to the level of existing gas supplies, thus eliminating risks involved in distribution of odorless gas.

Finally, the gas passes into pressure pipelines and is transmitted to Melbourne. A pressure regulator controls the flow of gas into the pipeline by maintaining the gas pressure in the whole plant at a constant level.

The steam required in the process will be generated in 55,000-lb/hr boilers operating at a pressure of 600 psig.



Oil and water wash towers where the produced gas is scrubbed to remove impurities.

Boilers have been designed for spreader stoker firing using raw brown coal which will come from the open cut by belt conveyors. The steam produced will be superheated to 977° F in independent superheaters fired with waste gas.

To provide the essential requirements of oxygen used in the process, a Linde-Frankl air separation unit is being installed. Initially two oxygen units will be located at Morwell and each of them will be capable of producing 102,000 cu ft of oxygen per hour of 95% purity.

During the production of gas, two major by-products are recovered: tar and benzene—the former being recovered from the condensation plant. It is distilled to provide the wash oil required for absorbing the benzene from the gas, the heavy fractions being sold either as tar or treated to recover the oils and waxes they contain.

The benzene stripped from the gas will be recovered from the wash oil by steam distillation. This crude benzene will be further refined to produce gasoline.

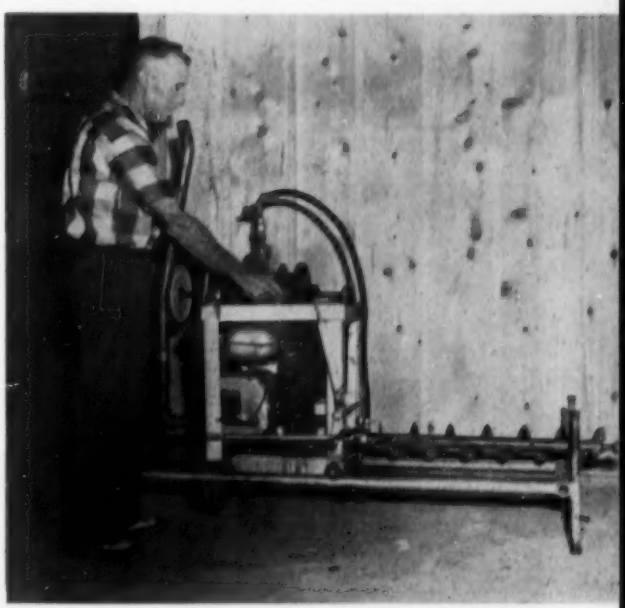
When the plant is opened, it is anticipated that the by-products will be 1300 imp. gal. of gasoline, 1200 imp. gal. of oil and 3000 gal. of tar per day. By 1975, when the production of gas is expected to be 120 MMcf/d, the output of by-products would include 20 million imp. gal. of gasoline, 22 million imp. gal. of diesel fuel and fuel oil, 13 million imp gal. of tar, 5 million imp. gal. of high-octane benzene and 1.5 million imp. gal. of solvents per year.

Three 90-ft high sets of processing towers are nearing completion. One set of towers will make 90 tons of liquid oxygen per day, another will wash carbon dioxide from the gas, and a third will purify the water for use again. The $18 million plant uses more than four-fifths of the energy it handles for productive purposes.

The pipeline, through which the gas will be moved to Melbourne, is being laid in a 4-ft deep trench at the rate of a mile per day. It will cost $4.5 million.

Production is scheduled for June 1956 and the initial output will be equal to 40% of Victoria gas needs, but as production is stepped up towns along the pipelines will be served first and the supply then extended to other cities. ■

HE MADE HIS OWN



IF it isn't available, build it yourself. This is the philosophy that led W. L. Pitts, Consolidated Gas Utilities Corp.'s Duncan, Okla., distribution superintendent, to work for seven years to perfect a machine for boring under streets, highways, and railroads. The Pitts Portable Pipeline Auger is the result. The invention makes a hard job easier and offers economies to the user. In this way, Mr. Pitts has helped his company. In addition, he has helped himself because he will get a royalty on each Pitts unit sold.

It is a track-mounted auger powered by a 7.5-hp gasoline engine driving a drive shaft through a V-belt power-transfer. The drive shaft has six square threads per inch which transmits movement to the motor and auger assembly—the action is much like that when a nut is tightened or loosened. The track is 66 in. long by 14 in. wide. The unit can be worked from a bell hole that is 6 ft long, 2.5 ft wide, and to desired depth. Auger sections are 30 in. long and join with ⅞-in. box and pins. Designed drilling range of the mechanism is 40 ft and auger sizes are for drillings to accommodate pipe up to 4.5 in. OD. ■

Fig. 1. An installation of lubricated plug valves in a gas distribution system is shown in this picture taken in the early 1920s.

Lubricated plug valves first were put into use by gas companies 40 years ago. Their traditional reliability and tight closure have remained the same over the years, but now the valves have begun to get "smart" and figure out for themselves what they are supposed to do, then do it. It's all a part of the trend toward automation in the gas industry.

Automation... and the lubricated plug valve

By PAUL A. MANOR, Chief Engineer
Barberton (Ohio) Division, Rockwell Manufacturing Co.

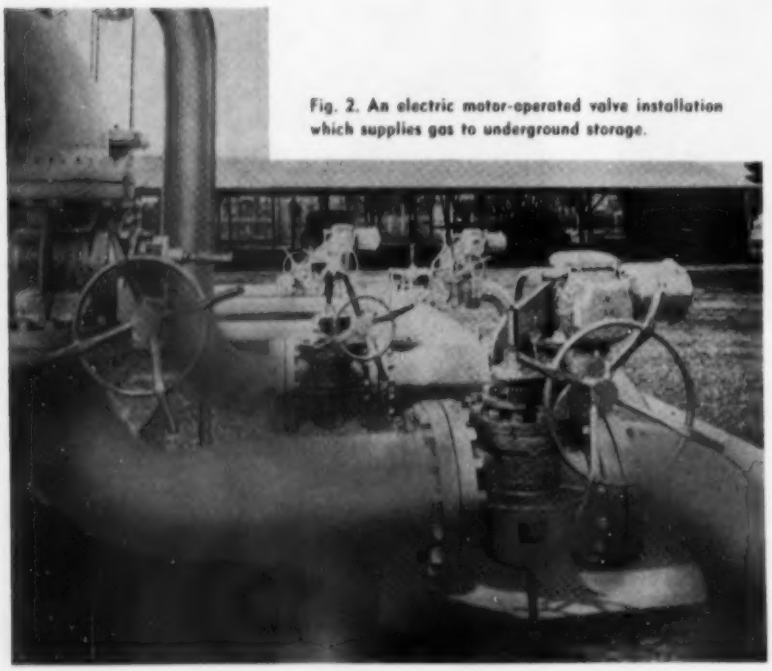


Fig. 2. An electric motor-operated valve installation which supplies gas to underground storage.

PLUG valves when used strictly as valves are not new to the gas industry, and you are all probably very well acquainted with their performance. It just so happens that this is the 40th anniversary of the lubricated plug valve.

Fig. 1 shows an early installation of Nordstrom lubricated plug valves in a gas distribution system. This installation was made around 1920, as you can readily see by the appearance of the mechanical equipment on the field with the valves. These valves are still giving good service, although the cement mixer has long since been cut up for scrap.

With respect to automation—there are many definitions of this fairly new word which is becoming increasingly more familiar; but I like to think that an admonition of my mother's comes closer to describing it than many of the much longer descriptions that I have read in the technical literature.

Whenever mother gave us boys a job to do and then found us doing it the hard way, she would say, "Boys, you should make your head save your hands." I believe this description is the essence of automation.

We are always aware, when we look at what we are making now, that unless we can find some way to make it better, that we may not be asked by our customers to make it again. It is this constant awareness that drives the engineer to change and change—always striving to make things easier for the hands to do.

The idea of partial automation is not new by any means—the ordinary engine lathe, or plain milling machine, are common examples of machines which perform a large share of their functions automatically. However, the concept of lining up a whole series of operations or processes so that they are accomplished in the proper order to the proper degree without intermediate direction by operators is fairly new.

The gas industry was one of the first to recognize this idea and practice automation on the average citizen.

In the 20's, Henry L. Doherty and some of his associates began working on the idea of converting the house-heating furnace to a completely automatic piece of machinery. They, of course, found that by its very nature, gas was much more susceptible to automatic control than any of the other common fuels.

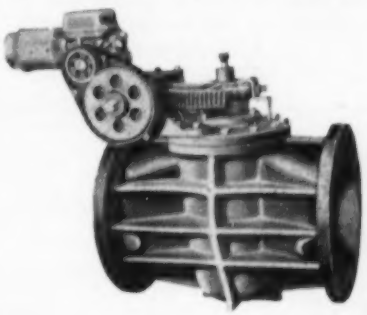
In the gas-fired domestic heating plant, we see one of the first widely accepted examples of true automation.

It is an example of a process which is entirely automatically accomplished and controlled, from its conception until the final results. This is a much more completely automated process, from a theoretical standpoint, than many of the so-called automated lines in factories. In some cases it even introduces a rudimentary type of electric computer which senses outside weather conditions and varies the temperature within the house to maintain a comfortable environment for the occupants, rather than merely maintaining a constant inside temperature. In order to set this entire train of events into action, the householder merely sets the theremostat to the desired temperature and the automatic heating system takes over and maintains this temperature indefinitely, regardless of variations in outside conditions, without further care or attention on the part of the householder. This idea has become so commonplace that few people see anything remarkable about it anymore, yet in many respects it is a much more refined example of automation than many of the much publicized industrial processes that we are hearing about.

In the early days, the emphasis was on automation on the premises of the customer. Every effort was made to make life easier and more comfortable for the customer. However, time has marched on and we are now coming to the point where automation is beginning to take hold with the producer.

In order to get the gas to both domestic and industrial customers within a city, a pipeline network is required. In order to control the flow of gas within this network, shut-off and regulating valves are required.

Fig. 4. Electric operated valve.



Remote operation of valves can be used by a gas dispatcher to control direction of flow or to actually control pressure. This type of operation is used mainly to control large volume flows at intermediate pressures. An example of this type of operation is the case of a gas utility company which must take a large demand load from a pipeline company. During the off-peak period, the excess gas has to be diverted into a storage field. A remotely operated valve operated from the dispatcher's office can be used to accomplish this diversion. In some cases, the valves may be operated from full closed to full open; but in other cases, the valve is used to throttle. *Fig. 2* shows an electric motor-operated valve installation supplying gas to underground storage.

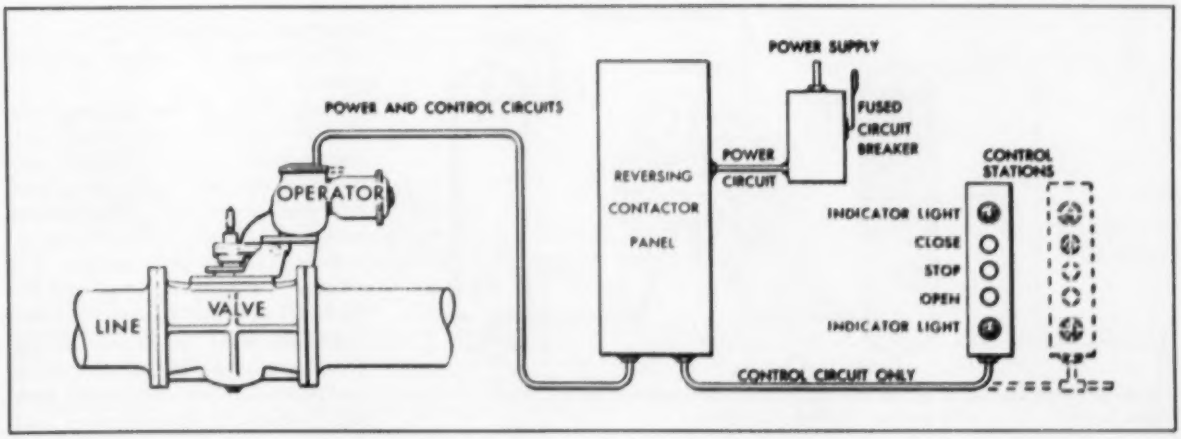
The control circuit for such an installation is shown in *Fig. 3*. Limit switches open the circuit as required when the valve is in the extreme positions.

Indicators can be furnished to show the full open and closed positions only, or a Selsyn dial type indicator can be supplied which shows the valve in all intermediate positions, as well as open and closed. If the valve is being used to control pressure, auxiliary equipment can be obtained to continuously record the pressure at a central control point.

Fig. 4 shows an electric operated valve.

The signal, which advises a remotely controlled valve to operate, can be transmitted to the valve in a great variety of ways. Ranging all of the way from the foreman telling someone to walk over to the valve and close it by

Fig. 3. Simplified wiring diagram showing a typical electric circuit for operation of a valve from a remote location.



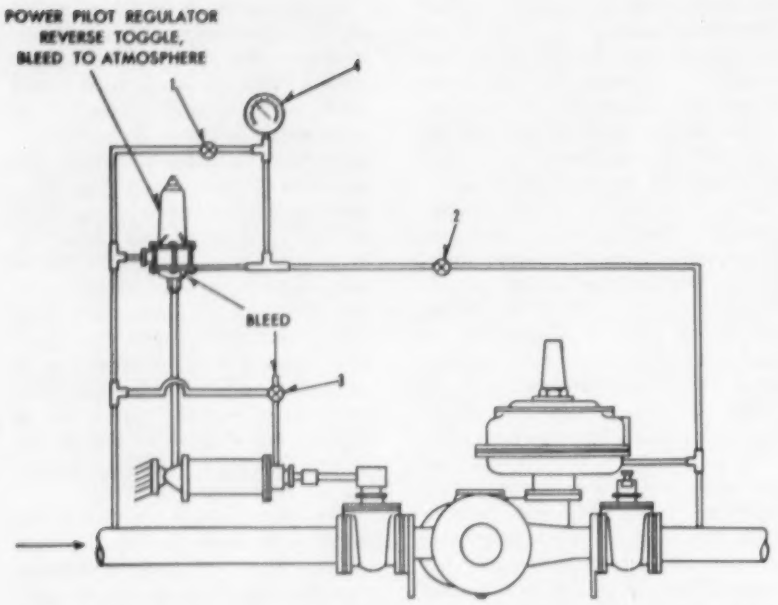


Fig. 5. Simplified drawing of valve used to shut off distribution line in case of regulator failure.

hand—then coming back and reporting that the valve had been closed—to the dispatcher pushing a button in his office, which will cause a modulated radio microwave beam to actuate a relay on the valve which in turn will cause it to change its position and report back over the same beam what its new position is. This can all be accomplished in less than a minute's time.

The safe transmission of gas is being emphasized more every day. Automatic operation of valves can be an aid in this program. For many years, cylinder-operated valves, which will close in case of a pipeline break, have been used on pipelines as a conservation and safety device. A slight modification of this type valve can be used to shut off a distribution line in case of a regulator failure. A simplified version of this is shown in *Fig. 5*.

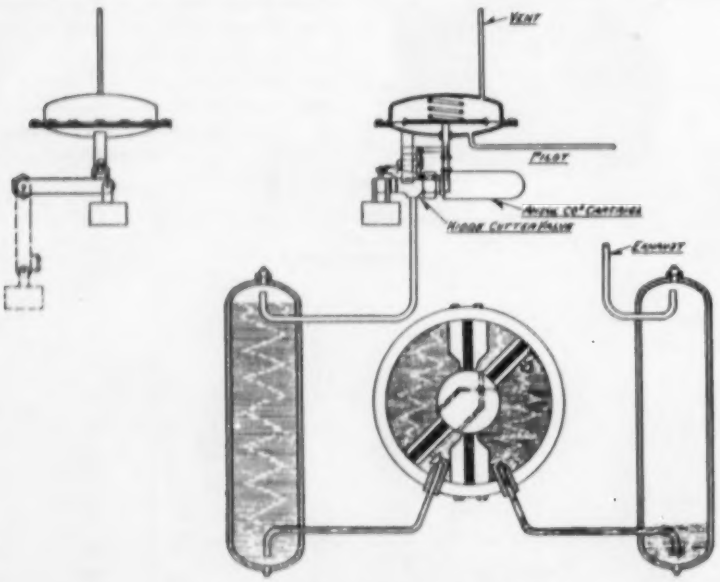


Fig. 6. Schematic drawing of system used by Michigan Consolidated Gas Co., where valve is closed by either over or under pressure at outlet of regulator.

In this installation, if the regulator should fail in such a manner that the outlet pressure starts to increase beyond control, a pilot valve will open and allow line pressure to close the Nordstrom valve in front of the regulator.

A modification of this system used by Michigan Consolidated Gas Co. is an arrangement that enables the valve to be closed by either over or under pressure at the outlet of the regulator. If there is insufficient energy available in the gas line itself, a small bottle of high pressure gas can be used to operate the cylinder, rather than gas from the main.

Fig. 6 shows a Shafer operator having this system of operation.

Considering the rate at which relief valves are being installed, we sometimes get the idea that the main purpose of the pipelines is to supply gas to operate the relief valves. Because of the straight-through flow pattern of plug valves, they have very high capacities when used for relief or blow-off valves.

Fig. 7 shows an installation used in the Southwest. In this installation, a Ledeen operator is used on a blow off valve.

The control for such a system can be accomplished in a number of different ways depending on what is desired. This particular installation was designed so that if normal pressure was restored, the valve would return to the closed position.

A very interesting use of lubricated plug valves is as very large capacity regulators. The Pacific Gas & Electric and the Southern California Gas Cos. started investigating the possibilities of such an application in 1937, in order to achieve two objectives: (1) Minimize pressure loss through control valves under wide open conditions, and (2) solve the noise problems in an indirect way by burying the plug valve and operating it through extended gearing.

Many types of installations were tried and more than one proved successful. Both cylinder-operated and air motor-operated valves were used with good results. One of the systems is shown in *Fig. 8*, which shows an instrument-controlled valve using a valve positioner. Oil pressure was used for the actual valve operation of the valve.

Another early installation at the Crenshaw station utilized air motors (gas powered) operating through gearing. To minimize "over-shooting" and

"hunting," an intermitter was included in the setup to cause the valve to move only slightly, then pause for a sufficient time to compensate for the system time lag before moving again.

While this system of control, known as the "hunt and peck type," is fairly satisfactory and is still in operation, the complexity of the controls, the wide pressure variations, and the slow response leave room for improvement.

There are now available positioning type controls which can be connected to either air motors or cylinder operators. These control the valve in such a manner that its turning velocity is directly proportional to the error by the pre-selected regulating pressure and the actual regulated pressure. It is obvious that such type of control will cause the valve port to cause the desired preset downstream pressure.

Fig. 9 is a schematic system using a gas relay to position the valve to maintain a predetermined downstream pressure. The interesting thing about this diagram is the fact that it incorporates a feed back system which advises the "brain" that the "muscles" have obeyed its command. The use of a feed back system eliminates the problem of hunting and makes automatically operated valves incorporating feed back systems very good regulators.

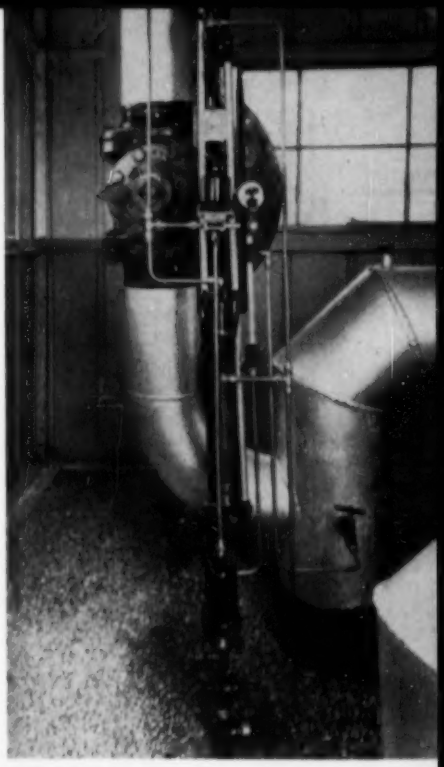
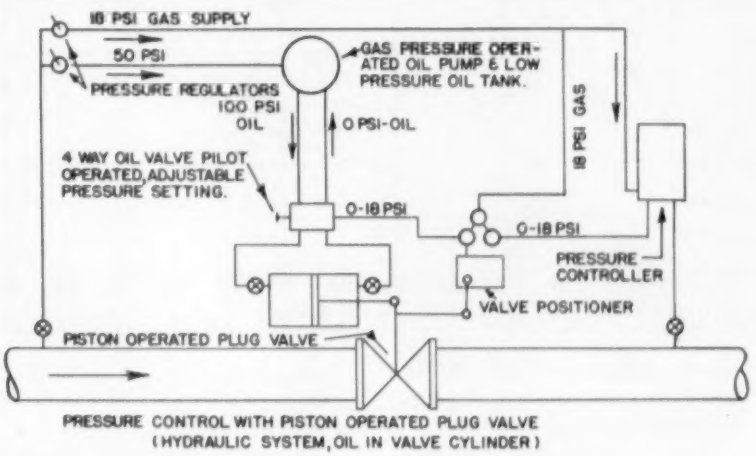


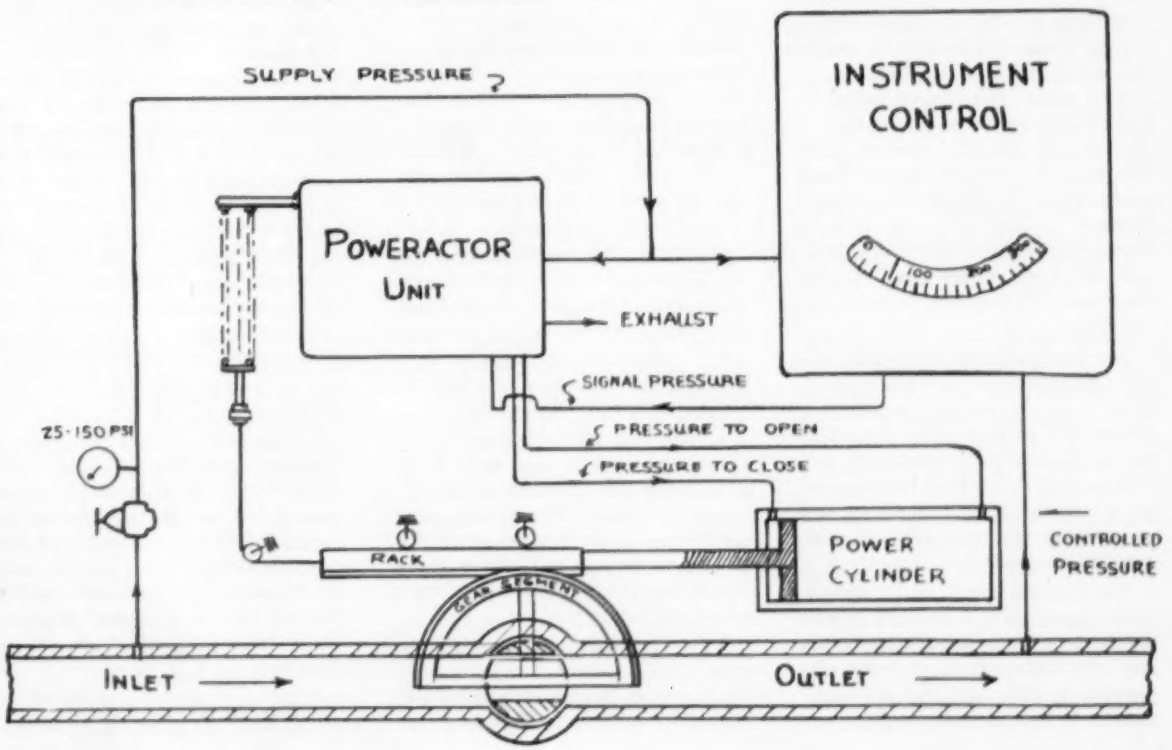
Fig. 7. Operator mounted on blowoff valve.



PRESSURE CONTROL WITH PISTON OPERATED PLUG VALVE
(HYDRAULIC SYSTEM, OIL IN VALVE CYLINDER)

Fig. 8. Diagram of pressure control with piston-operated plug valve.

Fig. 9. Schematic system using a gas relay to position the valve to maintain a predetermined downstream pressure.



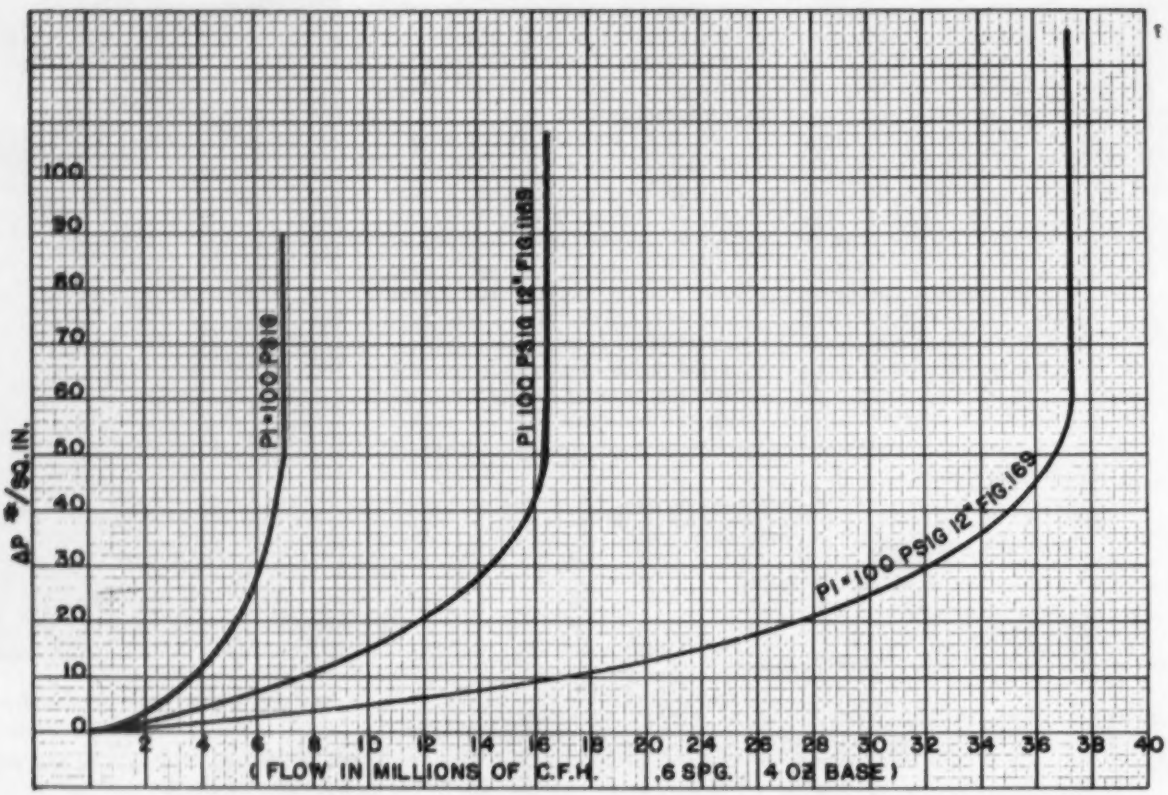


Fig. 10. Graph showing plot of conventional high pressure balanced valve regulator for inlet pressure conditions of 100 psig.

In those installations where insufficient gas pressure is available to operate the valves and it is permitted to use electric power and control, the problem becomes even more simple because the valve requires only the most primitive kind of a closed loop feed-back servo system to govern its position. There is no limit to the size of valve which can be controlled in this manner—the larger valves simply require more power but utilize the same sensing system.

The principal application of the plug valve arranged to be used as a regulator would seem to be where either the volume of gas to be handled is so high that an unduly large number of conventional regulators would be required, or where the inlet pressure is low enough that the pressure drop through conventional regulators is too high.

For example, the 12 x 12 conventional regulator will pass .60 specific gravity gas at 4-oz base pressure at the rate of 7 MMcf per hr when the inlet pressure is 100 psig and the outlet pressure is 5 psig. A 12-in. regular pattern Nordstrom valve will pass 37.4 MMcf/hr of the same type of gas under the same pressure conditions.

Fig. 10 shows this relationship graphically. On this graph is plotted a conventional high pressure balanced valve regulator for inlet pressure conditions of 100 psig. This is the line which is on the extreme left of the graph—plotted in terms of flow in MMcf/hr of .60 specific gravity 4-oz base pressure gas per hour against pressure loss in pounds per square inch.

The line which lies in the center of the graph shows the flow rate for a 12-in. Fig. 1169 venturi pattern Nordstrom valve, and the line which lies to the far right on the graph is for a 100-psig inlet condition on a Fig. 169 regular pattern Nordstrom valve.

I think it is fairly obvious that the capacity of the Fig. 1169 valve is approximately 2⅓ times that of the conventional regulator for the same pressure drop; and the capacity of the Fig. 169 is approximately 5½ times that of the conventional regulator, all other conditions being equal.

Stated in another way — when the flow is in the subsonic region the 12-in. Fig. 1169 Nordstrom valve would have 20% the pressure drop of a conventional regulator, and the 12-in. Fig. 169, a pressure drop of 3% for the same flow rate.

Because the low pressure drop would enable smaller valves to be used to obtain equivalent pressure drops, a potential application for valves used as regulators would be as monitor regulators installed in existing vaults, which already contain a conventional regulator preceded by a Nordstrom valve. In many instances the vault is too small to allow the installation of another regulator; whereas, there would be plenty of room to install and motorize the present Nordstrom valve and convert it to a monitor regulator. We have been studying this application recently and indications are that it is quite feasible.

In conclusion, let me state that the traditional reliability and tight closure of the lubricated plug valves are the same as they have always been; but that in addition to this, the valves are now beginning to get "smart" and to figure out for themselves what they ought to do—and then do it, rather than requiring someone to come around and operate them. ■

This article is adapted from a talk presented at the AGA distribution conference in Chicago, May 7-10.

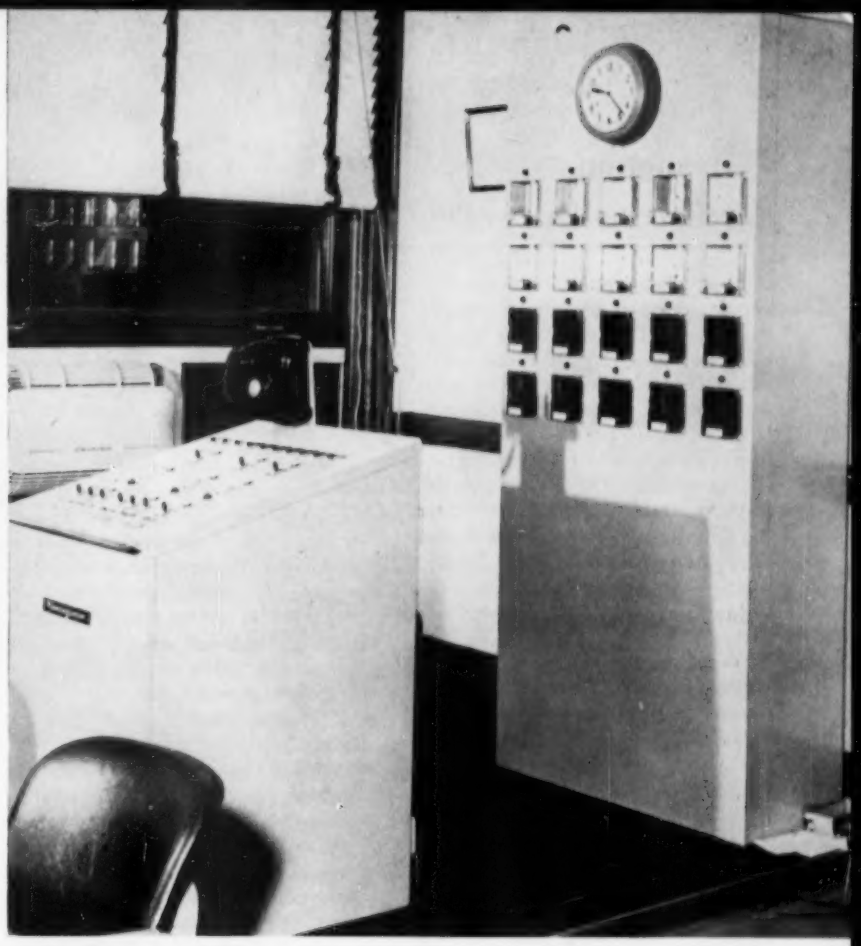


Fig. 1. The dispatcher's office at Manufacturers Light & Heat Co., showing the remote control console (foreground) and receiving board.

Manufacturers Light & Heat Co. spent $22,000 to install telemetering and remote control equipment. This move to automation resulted in a labor savings of $33,000 the first year. Here are the details of the system.

Telemetering system saves money for distribution company

By D. K. RUTH, Chief Communications Engineer • The Manufacturers Light & Heat Co., Pittsburgh

THE design and installation of the telemetering and remote control equipment now operated by the Manufacturers Light & Heat Co., Pittsburgh, presented the company's communications department with several problems.

Purpose of the installation was to effect a system for telemetering pressures and controlling regulator operation at three attended regulator stations. Gas pressures in the several lines at these stations were to be reported in the system dispatcher's office in downtown Pittsburgh, and regulators at these three stations were to be remotely controlled from the dispatcher's office. Two of these three stations were approximately seven airline miles from the dispatcher's office, and the third was some 30 miles distant. All of these pressures were to be continuously telemetered individually, rather than sampled at various time intervals.

Telemetering as used in this discussion means simply the measurement in pounds per square inch pressure in a gas line at some distant point. It is accomplished by converting a reading of pounds per square inch gauge at the remote point to electrical energy by the telemetering transmitter and the transmitting of this electrical energy over a communication medium to a telemeter receiver which interprets this electrical energy in terms of pounds per square inch gauge, which can be read on a calibrated chart, gauge, or a typewritten sheet.

Remote control is simply the control of pressure at some point remote from some other point. The distance between these two points may be a few hundred feet or many miles. Control again is accomplished by converting the desired control to electrical energy which can be transmitted over a communications medium from the control point to the

Telemetering system... Some of the installations are over leased lines

controlled location where the electrical energy is used to activate a controlling mechanism. This controlling mechanism may be an air controller, a motorized pilot loading valve, or some similar device, and can be used to control almost any operation from that of mashing potatoes to that of opening or closing windows. The desired operation at Manufacturers was to raise or lower the downstream pressure on a regulator, or to open or close gate valves.

Electrical energy for telemetering and remote control systems is transmitted over a communications medium. This medium can be a leased telephone circuit, or a privately owned telephone circuit. It may also be a microwave radio circuit. For the sort of service required in the Manufacturers Light installation, it was essential to use leased telephone lines. Some of the installations are over leased lines; others are over the company's privately owned telephone lines.

Complicating the installation was the fact that space in the general office was limited. It was impossible to locate the power supplies, relay panels, tone generators and auxiliary power equipment in a separate room at the downtown office. All of this equipment had to be located in the dispatcher's office.

Special equipment

By working with the instrument section of the switch gear department of Westinghouse Electric Corp., a console-type installation was developed. This allowed us to house all of the relay equipment, power supplies, and tone generator equipment inside the console unit. *Fig. 1* shows the control console with the various control switches, buttons, and lights on the top panel. Seven spring-loaded toggle-type switches are mounted from left to right along the lower section of the sloping panel.

These switches enable the operator to raise or lower the downstream pressure at each particular regulator. For instance, when the switch is positioned to raise the pressure on the downstream side of a particular regulator, it causes a coded series of either four direct current or tone pulses to be transmitted over the telephone line. At the regulator end of the line, one relay only will respond to that particular coded series. When the relay receives its coded series of pulses, it closes, and in so doing closes the 110-v ac circuit to the reversible motor on the Bristol pneumatic controller.

Operation of this motor applies pneumatic pressure to the top of the regulator diaphragm, causing the regulator to open to the desired position. When the operator desires to lower the pressure, the control panel switch is positioned in the opposite direction, sending this coded series of four direct current pulses or tone pulses to another relay which responds only to this series of pulses or tones. This relay operates the motor on the Bristol pneumatic controller in the opposite direction, releases diaphragm pressure, and repositions the regulator to hold a lower outlet pressure. The circuit is so arranged that regardless of how long the operator holds the switch in the position for a particular function, the circuit will not remain in operation longer than five seconds. To attain a greater change of pressure, it is necessary that the operator return the switch to the neutral position before he can obtain another five-second operation of the motor which produces pressure change. This limiting feature is installed to prevent over-positioning or accidental operation of the facility.

Audible alarm

Immediately above this row of switches are three lights, one for each of the controlled stations operated from this console. These three lights are part of the supervisory control functions built into the operation of these circuits. When these lights are illuminated, they indicate to the operator that the specific relay desired has operated in accordance with his instructions. Directly above these lights are three amber lights marked "auxiliary power." Since our remotely located installations are equipped for automatic cutover to emergency power in the event of the failure of the commercial power source, these lights give an indication that the remote unit is operating on emergency power. These lights are operated in conjunction with the alarm switches directly above them. When a remote unit switches to auxiliary power an audible alarm is sounded at the console simultaneously with the lighting of the emergency power light. The operator throws the alarm switch to the opposite position, silencing the alarm, although permitting the light to remain lit. When commercial power has been restored at the remote location the light goes out and the alarm again sounds, causing the operator to restore the switch to its normal position.

Immediately above the alarm switches on the panel are three additional lights designated "channel." Upon failure of a telephone line such as an open or shorted line, the respective light will be illuminated simultaneously with the audible alarm. This circuit operates in identically the same manner as the emergency power circuit just described.

Emergency phone

The next row of two-position toggle switches is used for emergency telephone communication between the dispatcher and the remote point. By throwing the switch for a particular station into the upper position, the dispatcher rings the telephone at the remote point. Immediately after ringing he throws the switch into the lower position which connects his hand telephone with the telephone at the remote point. In the same manner maintenance personnel at the remote point can position their corresponding switch so as to ring the alarm bell on the console in the dispatcher's office and light the matching light in the top row indicating to the dispatcher which of the remote points wishes to communicate with him over the emergency telephone network. He then answers his call by positioning his switch to the talk position. This telephone communication is used primarily by maintenance personnel.

In addition to these supervisory features, these installations also provide the dispatcher with a means of determining the nature of any suspected trouble in the telemetering circuits. Directly at the top of the console panel are 10 push-button switches. Each of these switches corresponds to a telemetered circuit. All of the telemetered circuits on this particular installation are tone pulses, and by pressing the button for a particular telemetered circuit the operator can listen on the telephone set mounted on the console to the on and

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Fig. 2. This is a telemeter installation at a Manufacturers Light regulator station. Three telemeter transmitters are mounted on left of panel. Two pneumatic controllers are mounted at right. Valves below telemeter receivers are used for calibration of receivers.

off tones being transmitted by the telemeter transmitter at the remote point, if it is functioning properly. In the event that the tone pulses are inaudible, then it is obvious that a serviceman must be sent to the remote point to restore operation of the telemeter transmitter. Conversely, if the tone pulses are audible and the telemeter receiver is inoperative, it indicates that the difficulty is in the console at the dispatcher's office, and the serviceman would be sent to the dispatch location rather than the remote location. The entire rear section of the console may be opened, making it possible to "roll out" the equipment for servicing.

Fig. 1 also shows the front of the cabinet, housing the compact individual telemetering receivers. Ten of these receivers are presently installed and are shown in the two top rows. In order to provide for future expansion, cases for 10 additional receivers are mounted in the two bottom rows. The receivers continuously record the telemetered pressures on strip charts which are changed monthly. All of the receivers are provided with high and low pressure alarm limits, and the common alarm circuit provides both visual and aural indication of abnormal operation.

Auxiliary power

Auxiliary power supply for the console and the telemetering receivers sufficient for providing approximately four and one-half hours operation is housed in the bottom of the telemeter receiver cabinet. This auxiliary power unit will switch over automatically in case of commercial power failure, and consists of a 6-v nickel cadmium battery and the appropriate converter units to change this 6-v d-c to 110-v a-c at 60 cycles.

The battery is continuously charged by a so-called "trickle charging" unit, and also is provided with a fast-charging circuit which can restore the battery condition to normal immediately after each use of the auxiliary power. The battery of the unit rolls in and out of the bottom of the cabinet for convenient servicing.

The relative positions of the console and receiver cabinet in the dispatcher's office are also shown in *Fig. 1*. Both units are maintained on a slightly raised platform permitting the connecting cables between them to be placed in channels underneath the platform.

The remote or regulator station terminations of the installation are all somewhat similar, differing only in the number of telemetered or controlled circuits desired. *Fig. 2* pictures one of these installations. The three telemeter transmitters are mounted on the left hand section of the panel while the two pneumatic controllers are mounted to the right of these transmitters. The necessary gas tubing from the regulators is brought in on a bridged platform directly above the panels. The valves directly below the receivers are used merely for calibrating the receivers over their operating ranges. Provision is also made for the insertion of a deadweight tester on the manifold for purposes of calibration.

Escaping gas from the positioning jets in the controller is bled off through the top of the individual cases to outer atmosphere. Provision is also made at the controllers for switching to manual control or for completely bypassing the controller units.

Fig. 3 shows a portion of one of the remote controlled monitored regulator sets. In this particular installation the left rear regulator is the remote controlled regulator, and the other three regulators are provided with the conventional monitored controlling devices.

Costs of system

How much does this kind of an installation cost? There can be no doubt but that the dispatcher, because of the tremendous advantage to him of such an installation, is in favor of the installation regardless of its cost. But operating personnel are concerned with how such an installation can pay for itself by reduction in operating costs.

Previous to the installation of the remote control equipment two of the three regulator stations included in this installation had attended operation. One man was on duty during each 8-hr shift. In addition, there was an extra operator who relieved each of the regular operators two shifts each week. In order to avoid the payment of overtime for a sixth shift by this relief operator, it becomes necessary to have a relief operator for the relief operator, one shift each week, at each of the two stations.

The third station had only one shift operation, except for occasional extra attendants during the four winter months. The standard method of operation was for the dispatcher to notify the operator on duty whenever he desired a change in the downstream pressure from any one of the controlled regulators at the station. Since these stations have been on automatic control, no attended operation is required. The dispatcher controls the downstream pressure from his office in Pittsburgh.

Substantial savings

The total cost of all the telemetering and remote control equipment at the regulator stations and in the dispatcher's office, both material and labor, was $22,000. The operating cost for labor per year at these three stations was approximately $33,000. It can thus be readily seen that one year's labor operating cost is 50% more than the total cost of installation of the remote control equipment. There are few capital expenditures on the distribution or transmission system with such a wide margin of reduction of expense for the investment.

An installation made without the auxiliary supervisory controls provided in this installation could be made for considerably less money. Conversely, if more than this minimum of supervisory control is installed—and there are many additional options in the way of supervisory controls—then the installation cost will be proportionately higher. In this installation, only those supervisory functions that would tend to increase the safety or expedite the servicing have been installed. Supervisory controls to provide desirable but not necessary service must be considered as a luxury item, and in the final analysis it is the extent of supervisory control that will, to a large extent, set the ultimate cost. ■

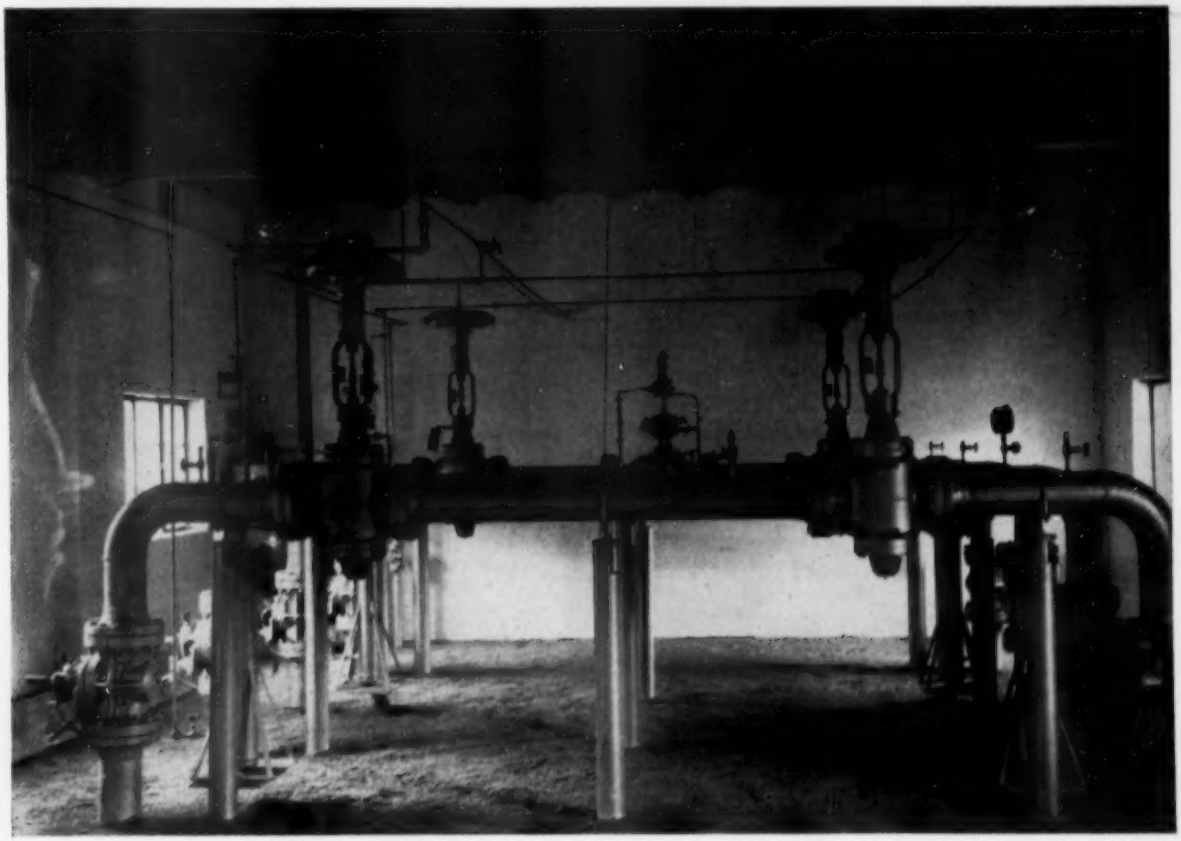
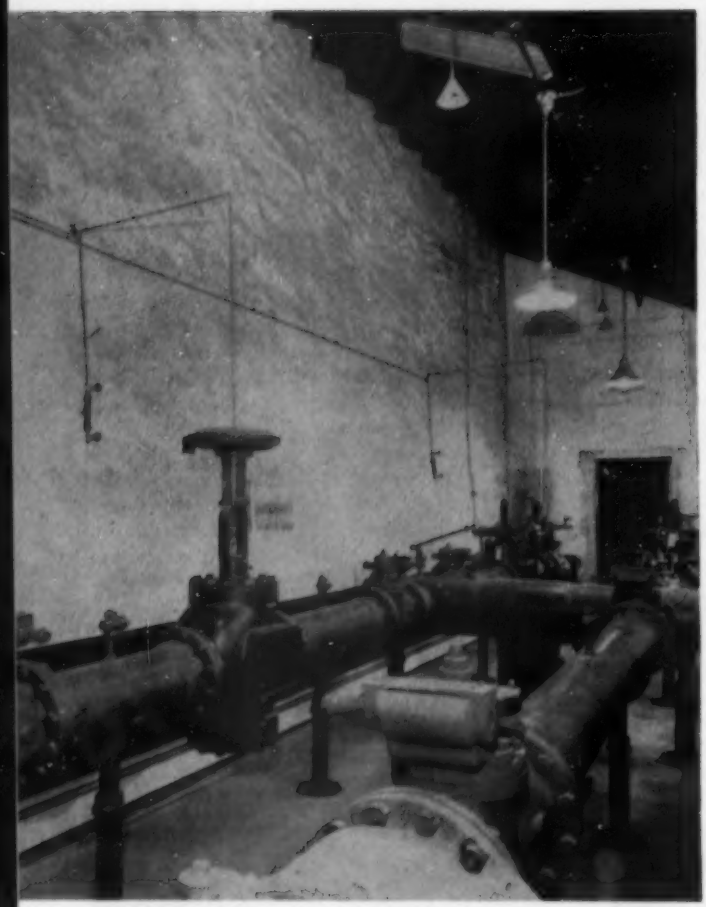


Fig. 3. This is a portion of one of the company's remotely controlled monitored regulator sets. Left rear regulator is controlled remotely, others are provided with the conventional monitored controlling devices.

This article has been adapted from a paper titled "Telemetering and Remote Control for Small Distribution Systems," presented by the author at the AGA Distribution Conference May 7-10, 1956, in Chicago.



This is an interior view of the automatic regulator station of the Philadelphia Gas Works, where the "silent watchman" is on duty. Small cone shown at top of picture collects samples of atmosphere, and sounds alarm five miles away when combustibles are present.

Automatic regulator station replaces old Philadelphia holders

Philadelphia Gas Works dismantled its Manayunk holder to make way for a modern regulator station. Following the growing trend to automation in the gas industry, the new station has a device that sounds a warning five miles away if a leak develops.

THE gas industry's trend for automation has caught up with one of Philadelphia's landmarks.

The Manayunk holder of the Philadelphia Gas Works, a division of the United Gas Improvement Co., has been dismantled and replaced by an automatic regulator station, which supplies gas for 14,000 customers.

The holder was built in 1853 by the Manayunk Gas Co., before the borough of Manayunk was incorporated into Philadelphia. In 1859 PGW purchased Manayunk Gas, and took over operation. Up to 1891 PGW manufactured gas at the plant. After the manufacturing was stopped, the holder was used for storage purposes.

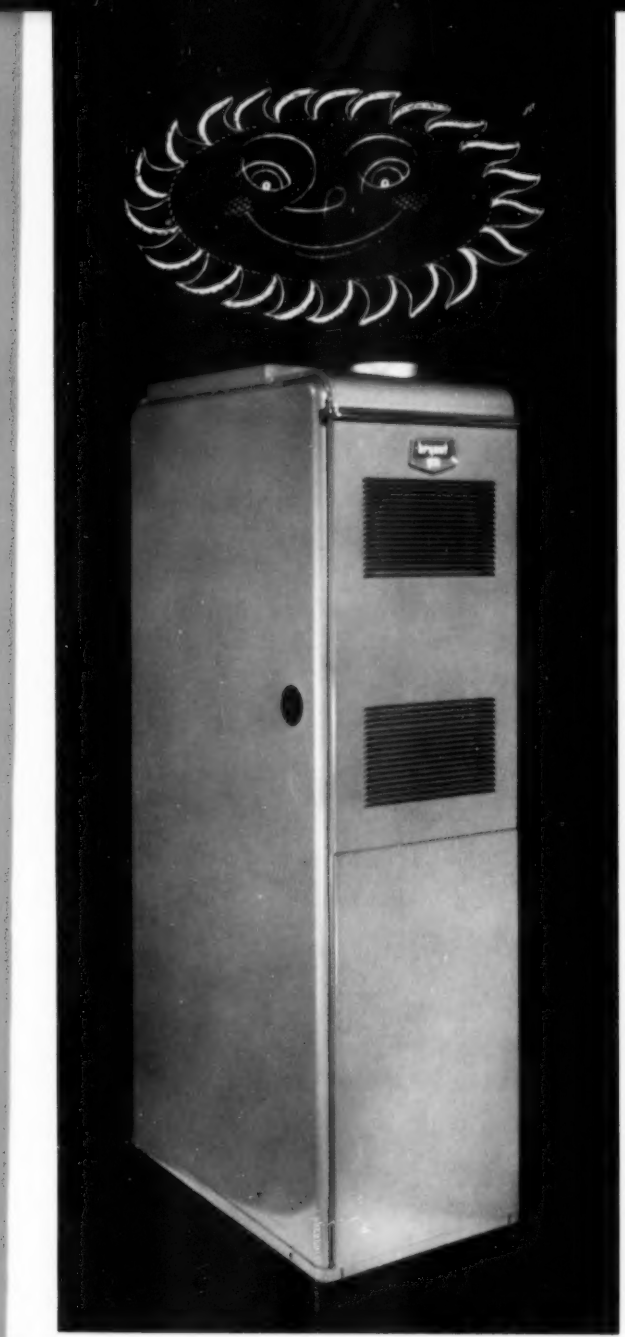
Now, the holders have disappeared and a modern, automatic regulator station has taken over. The new station incorporates many new features—including a "silent watchman" which sounds a warning five miles away if a gas leak should develop.

The station operates itself. Once every week, a PGW employee visits the building to collect the circular charts used to record gas pressures, and to place new charts in the recording apparatus. Aside from this, there is no need for personnel to spend much time at the station.

But because of the combustibility of the product, PGW management had to take steps to keep hazardous conditions under complete control. In such a station, a gas leak could go undetected for several hours.

Solution

To handle this problem, Philadelphia Gas Works bought and installed a combustible gas alarm which continuously samples the atmosphere in each of the building's three sections. If a leak should occur, a bell rings and a light flashes in the dispatcher's office, five miles from the station. Then, word is broadcast over the company radio network and a PGW car proceeds to the spot immediately.



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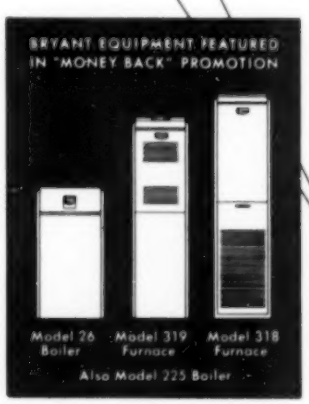
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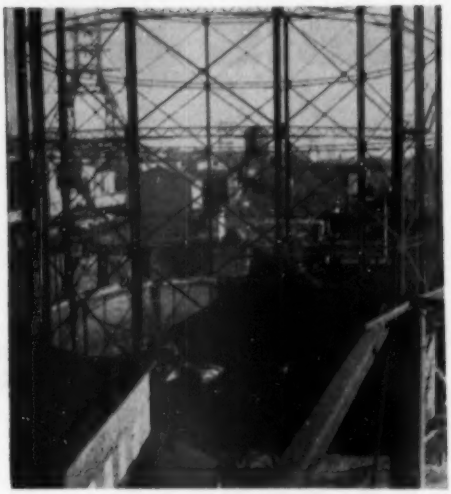
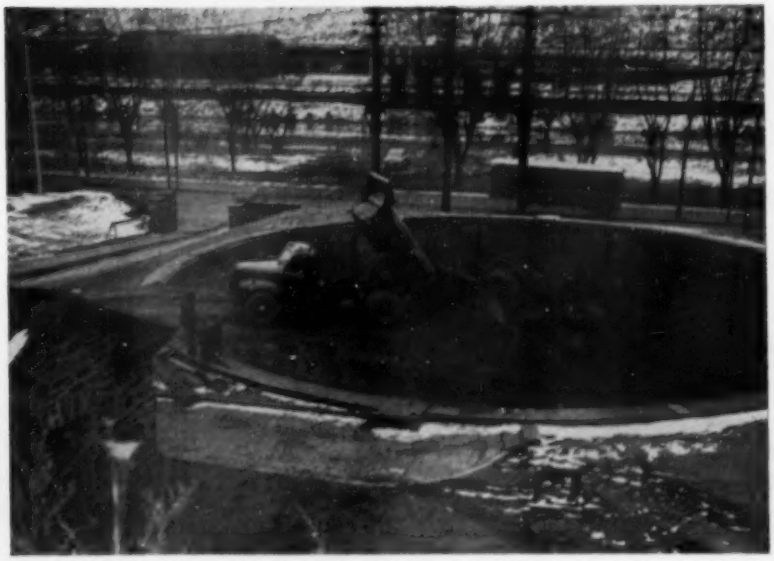


R. P. Dickol (left) and H. C. Missimer, assistant superintendent, engineering division, study a recording chart from one of the automatic gas alarms used by Philadelphia Gas Works.

Crane removes pieces of holder plates on floor of Philadelphia's Manayunk holder. The holder, built in 1853, was torn down and replaced by modern automatic regulator station.

Dump truck unloads fill dirt into pit of Manayunk holder station that has been dismantled. Total of 4100 yards of dirt was needed to fill pit.



In this station, samples are drawn from four different points—two in the valve room, one in the instrument room, and one in the basement.

The instrument which does the job is a product of Pittsburgh's Mine Safety Appliances Co. Here's how it works:

Samples of the surrounding atmosphere are drawn into the instrument and passed over one of two heated, sensitized platinum filaments which are a part of a balanced electrical circuit. The second of these filaments—the compensator—is sealed in a cell containing uncontaminated air. Any combustibles present in the air sample drawn over the first—the detector—filament will burn as soon as they come in contact with the heated wire. This increases the temperature of the filament and, consequently, its electrical resistance. The higher resistance of one filament upsets the balanced electrical circuit in direct proportion to the concentration of combustibles in the sample.

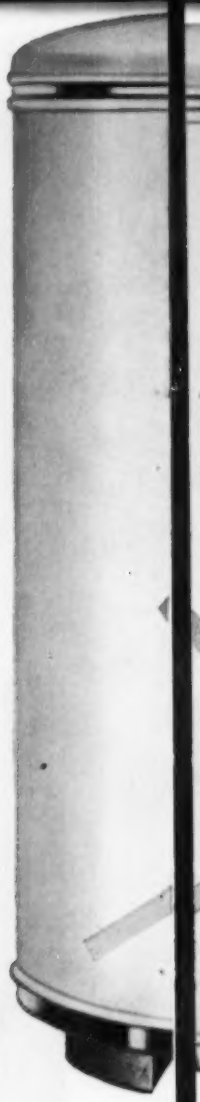
Degree of unbalance is measured by an indicating contacting meter, or relay, so designed that when the pointer is deflected to a preset mark, an electrical contact is closed, which in turn operates a double pole, double throw relay.

Relay operation

At Philadelphia Gas Works, the relay is used to open the signal-circuit rather than close it. The circuit—a telephone company circuit—which carries the signal to the alarm point in the dispatcher's office at maintenance headquarters is contiuously closed unless something goes wrong. When the alarm rings it means that there is a combustible present in the atmosphere at the station; that the telephone circuit has been interrupted somehow; or that there has been a power failure at the panel board where the alarm is mounted. Personnel immediately start to check all three possible causes, for PGW wastes no time in closing the circuit again.

Philadelphia Gas Works officials have solved a common problem with their new automatic station. Because of modern gas handling equipment, there is no need for continuous manpower at this regulator station, so workers are released for other duties. But in the time between visits to the station, a dangerous situation could arise if a leak did develop. The combustible gas alarm—PGW's mechanical watchman—makes this virtually impossible. ■

Standardization that Cuts your Costs



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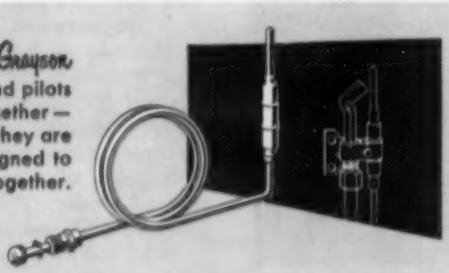
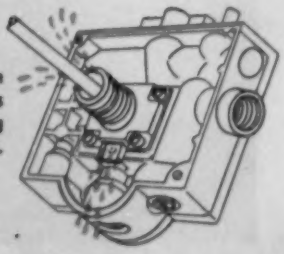


Air-Gap Construction Throughout Prevents Water Entering Gas Lines.



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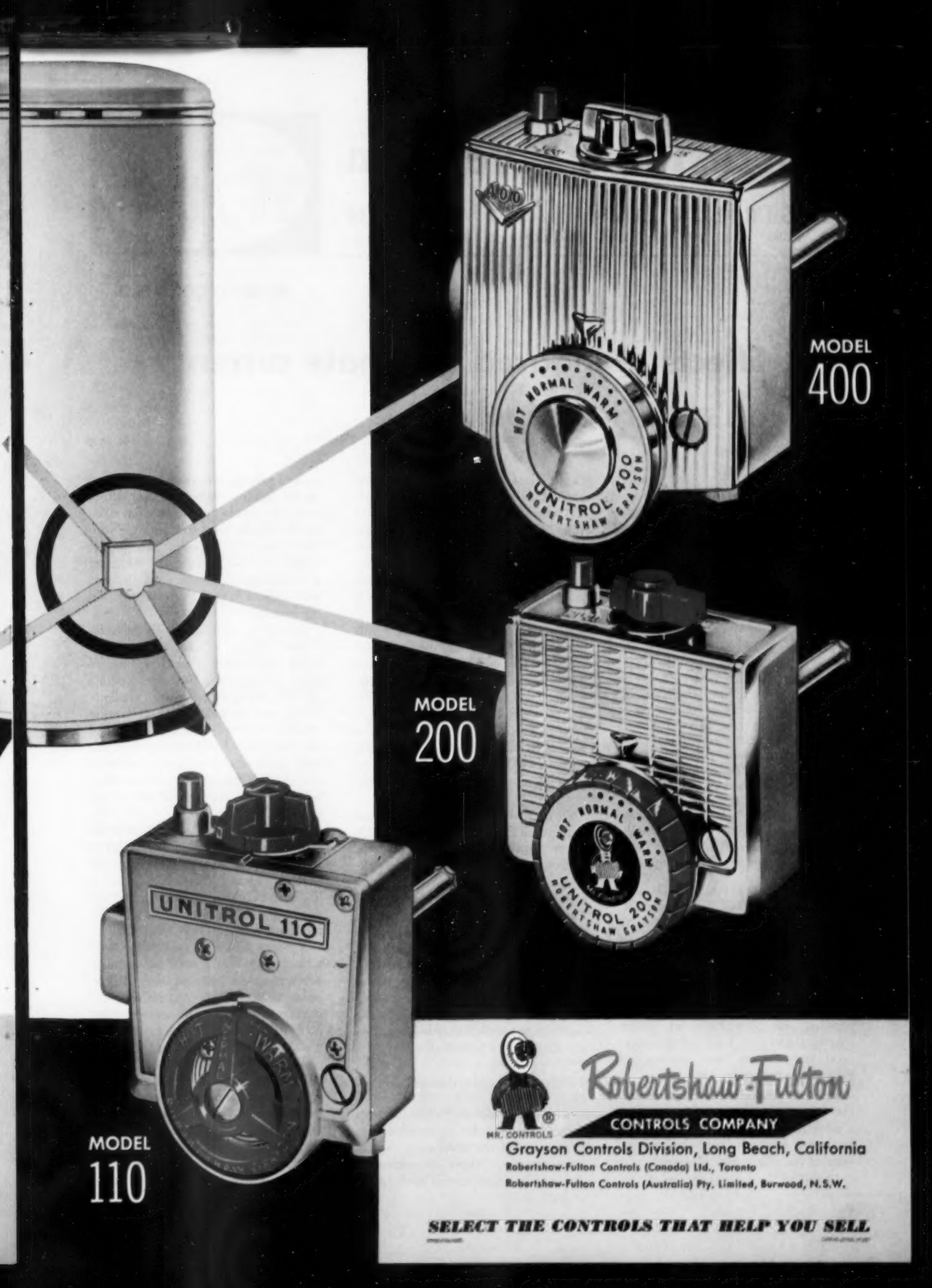
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ROBERTSHAW GRAYSON
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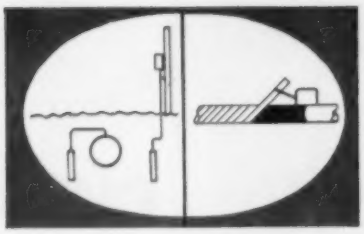

By GUY CORFIELD

Effects of induced alternate current on a buried pipeline

EDITOR'S NOTE: The right-of-way of an overhead electric transmission system is often a convenient route for a gas transmission line, and numerous gas lines have been installed between or closely parallelling electric transmission towers. Gas industry corrosion engineers have, of course, been aware of the resulting alternating current that is induced into the gas line, and there has been considerable speculation as to whether it has a corrosive effect as such, or because of possible rectification by iron oxide or other influences of the environment. The concept of actually making use of this induced energy, to control corrosion, is intriguing to say the least. The following paper, (condensed from the original) on "Induced Alternating Current used to Protect a Coated Pipe Line," by S. J. Bellassai of Transcontinental Gas Pipe Corp., Linden, N. J., delivered at the AGA corrosion conference in Chicago in May 1956, should therefore be of great interest.

APPROXIMATELY four years after construction of a 6⅝-in. OD lateral in Sewaren, N. J., a corrosion leak occurred on the line. The lateral consists of 1.1 miles of .375-in. WT welded steel pipe, somastic coated.

The right-of-way for the pipeline parallels, for practically its entire length, a group of high voltage overhead transmission lines leaving an electric generating station.

For a distance of 3700 ft, the lateral lies in sandy loam soil before crossing a tidal river. The remaining 1800 ft traverse a wet, salt marsh before terminating at the generating plant.

Electrical measurements made at the leak location with a steel bar reference electrode showed that the pipe/soil voltage varied from —0.6 to +0.1 volt. For the measurements, the negative terminal of the voltmeter was connected to the pipeline. When the same measurement was made with a copper sulfate electrode, a variation from —0.1 to +0.6 volt was shown.

The excessive vibration of the needle occurring while these measurements were being taken was an indication that an appreciable magnitude of alternating current was being induced on the pipeline. This raised the question as to whether or not soil conditions were such that the induced alternating current was being rectified with a resulting aggravation of corrosion conditions.

In order that the induced alternating current could be studied, an oscilloscope and a portable 110-v, 60-cycle, ac generator were used to measure the amount of induced alternating current voltage between pipeline and earth. The oscilloscope measurement verified previous measurements made with a model 240 Simpson meter which had shown that the magnitude of ac voltage between pipeline and earth was at a steady magnitude of 8.5 v when a steel bar was used as a reference. The oscilloscope showed that this induced ac voltage had a perfect sine wave.

Additional measurements

Various additional measurements were made in order to determine if rectification of the alternating current were occurring. These measurements consisted of simultaneous readings of ground voltage on tower footings and on the pipeline. They consisted also of readings of these ground voltages taken simultaneously with vacuum tube voltmeter readings between two copper sulfate electrodes placed in the earth at various spacings and configurations with respect to the tower footings and the pipeline.

One of the significant tests made involved taking simultaneous walkie-talkie radio-communicated readings of tower footing ground voltage, pipeline ground voltage and earth gradient. These tests showed that there was no correlation in the natural variations of the measured quantities, although the earth gradient observation showed that considerable magnitudes of stray fluctuating direct current existed in the earth.

Inasmuch as the characteristics of the soil around the pipeline were ideal to support concentration corrosion, the conclusion was reached that corrosion had been caused by this local action and not by the rectification of induced alternating current.

Throughout the period of time since construction of the line, no cathodic protection has been applied. An attempt to include the lateral into the cathodic protection scheme provided by a mainline rectifier in the area had proved impractical and the lateral had not been surveyed as a single unit. It was decided to check the coating on the entire lateral. A survey was made using a Pearson coating inspector. Three other holidays were found on the line, all in the wet, salt marsh area. These locations were opened. Two holidays were the result of construction damage

still plainly visible and the third was a pin hole fault in the coating. Minor corrosion pitting had occurred at each holiday location. All holidays were patched with the original coating material, somastic. Tests showed that the line was predominantly positive to earth at the leak location.

In order to determine if cathodic protection would be feasible by rectifying the induced alternating current, a test ground bed was set out. This ground bed consisted of eight ⅜-in. x 4-ft copperweld ground rods spaced at 10-ft intervals in a line at right angles to the pipeline with the first rod set at about 200 ft. A selenium rectifier stack with a rating of 25 amp and 18 v was connected between the pipeline and the test ground bed through an ammeter.

Direct current flow

The resulting half-wave rectification of the induced alternating current caused a direct current flow of 2 amp. This magnitude of direct current flow resulted in a ground voltage change per ampere of test current between pipe and earth at the measuring and regulating station of approximately 0.40v/amp at the mainline tap of approximately 0.35 v/amp; and at the leak location of approximately 0.43 v/amp.

A site for a permanent ground bed installation was selected with particular attention paid to the matter of accessibility and right-of-way availability. The soil resistivity when checked at this site was found to be 250 ohms/cu centimeter. Electrical measurement of the rectified voltage between pipeline and the test ground bed at this location showed that approximately 5 v dc would be available for cathodic protection.

Recording charts of pipeline ground voltage showed that the maximum exposure condition that must be corrected was approximately 0.6 v; by simple calculation, it was determined that approximately 1.4 amp of cathodic protection current would be required. Since the galvanic potential difference or back emf between a graphite ground bed and a steel pipeline is usually approximately 1 v, an actual value of 2 v was assumed for ground bed design. Thus, only 3 v of rectified ac voltage would be available for cathodic protection current. It followed then that the circuit resistance between pipeline and permanent ground bed, including the rectifier stack, should be not more than approximately 2.1 ohms.

A selenium rectifier stack rated at 5 amp and 15 v dc was purchased. It was found by measurement that the forward resistance at a current flow of 1.5 amp was approximately 1.8 ohms. Knowing this, it was easy enough to determine that to obtain a total circuit resistance of 2.1 ohms, the resistance of the ground bed and connecting cable should not exceed 0.3 ohms.

Dwight's equations[1] were used in other calculations. It was found that a permanent ground bed consisting of 10 3-in. x 60-in. graphite rods spaced at 24-ft intervals, and 500 ft of 1/0 copper cable could be expected to provide a circuit resistance of the required value.

Actual installation was relatively simple. A rectifier stack rated at 5 amp and 15 v dc was mounted in a weathertight shopmade steel box which had been put into place on a pipe pole adjacent to the pipeline. The graphite rods were merely pushed vertically into the marshy ground and their pigtail connections soldered to the 1/0 header cable running from the ground bed to the rectifier. Header cable connections were then taped. Scotch Fill was used for smoothing the roughness of the solder, US Korona for the rubber tape inner-wrap, and Scotch 33 for the outer-wrap. Scotch Kote was painted over the entire joint to act as a sealer.

Average

After the final connections were made and the installation placed into service, it was found that the closed circuit, dc voltage was approximately 2.80 v. The direct current flow has been averaging about 1.4 amp.

Recently taken recording charts show the average current output at approximately 2.5 amp. Current output varies as load on the high lines increases and decreases. Other charts indicate that the line is being polarized and apparently building up a calcareous coating since the line can remain negative to earth for a considerable period with cathodic protection current removed. Conditions in this low resistivity marsh with brackish water are ideal for supporting the deposit of such calcareous materials. ■

Reference: 1 H. B. Dwight, *Calculation of Resistance to Ground*, *Electrical Engineering*, 55, 1319-1328, (1936) Dec.

GAS current reading

AUTOMATIC TEMPERATURE CONTROLS FOR COMMERCIAL GAS COOKING EQUIPMENT — This publication, AGA Laboratories Research Bulletin 70, contains pertinent information and results developed during the project.

Field information given by controls and appliance manufacturers, gas company service personnel and independent commercial gas appliance servicing organizations is presented, together with laboratory evaluations of controls widely used during the life of the project and of newly developed controls. The report is a new design tool which should lead to a better understanding of proper selection and application of temperature controls to gas appliances.

Copies of the report are available from AGA headquarters, 420 Lexington Ave., New York 17.

API SPECIFICATION SHEET FOR STEEL GATE, PLUG, AND CHECK VALVES—The 7th edition of this specification for pipeline service is officially designated as API Std. 6D, 7th Edition, February 1956.

This is a revision of a previous edition dated May 1949 and reflects current requirements on pipeline valves, including sizes up to 30-in. diameter. The revision was developed by representatives of the pipeline industry and manufacturers of valves. It should fill a need and considerably facilitate purchase of suitable valves.

Copies of the specification are available from the American Petroleum Institute Division of Production, 300 Corrigan Tower Bldg., Dallas. Cost: 50 cents per copy.

UNDERGROUND STORAGE OF LIQUID PETROLEUM HYDROCARBONS IN THE UNITED STATES — This 104-page, two-part publication has been released by the Interstate Oil Compact Commission.

Part I summarizes the general conditions for underground storage which apply throughout the U. S., dealing primarily with the geologic and engineering aspects of underground storage.

Part II is a compendium of state reports describing storage projects now in operation and possibilities for other storage facilities in 42 states.

Copies may be obtained from IOCC headquarters, Box 3127, Oklahoma City 5, at a cost of $1 per copy.

GAS news

New addition to Houston's skyline is the Bank of the Southwest building, which boasts one of the most important oil and gas departments in the U. S.

Gas department integrated into Houston bank

During mid-June a new banking facility opened in Houston that has integrated one of the most important oil and gas departments in the United States into the normal operations of a commercial bank. Bank of the Southwest (formerly named The Second National Bank of Houston) added a majestic new building to the skyline of Houston—key city in many of the major gas producing and long distance gas pipeline operating phases of the gas industry.

A. G. McNeese
President

H. Vance
Vice President

The oil and gas department is headed by Harold Vance, vice president, a man who is considered a national authority on the evaluation of oil and gas properties. Mr. Vance is a consulting engineer and independent oil operator in addition to his new position with the bank. He was head of the Petroleum Department of Texas A & M College for many years.

A. G. McNeese Jr., president of the bank, announced that others in the oil and gas department will be Harry L. Dedman, Frank E. McGonagill Jr., and Herbert F. Poyner Jr., all petroleum engineers; H. L. Howell Jr., landman; and Mercer B. Richardson, accountant.

Underground gas storage exceeds 2 trillion cu ft

Total storage reservoir of the gas industry passed the 2 trillion-cu ft mark during 1955, according to the American Gas Association fifth annual statistical report on underground storage in the United States.

This ultimate capacity, which includes all native gas remaining in the reservoirs when storage operations were started, reached a total of 2,095,814,139 Mcf in 1955. This was an increase of 237 MMcf over 1954. Since these statistics were first gathered in 1951, the total ultimate capacity has increased 1.18 trillion cu ft. Maximum gas in storage, which represents the highest balance of total input over total output of gas in storage, stood at 1.15 trillion cu ft on Oct. 31, 1955, an increase of 139 billion over 1954. The increase since 1951 in this category was 603 MMcf.

The annual report was prepared for the AGA committee on underground storage by its subcommittee on statistics. The committee is headed by John B. Corrin, Hope Natural Gas Co. Chairman of the subcommittee is H. L. Fruechtenicht, Michigan Gas Storage Co. Facilities for underground storage represent a total investment of approximately $377 million, the committee estimates. This includes all physical properties and cushion gas.

Both total output and input for year ending Oct. 31 increased in 1955. The total output was 352 MMcf, an increase of 48 MMcf over the previous year and 152 MMcf over 1951. The total input to storage for the year 1955 was 503 MMcf, an increase of 71 million over the previous year. The increase in input over the year 1951 was 165 million.

The maximum day output for 1955 was 6483 MMcf. This is equivalent to approximately six systems of a million Mcf per day capacity. The increase over the previous year was 919 MMcf and for the five-year period 1951 to 1955 it was 3242 MMcf.

At the end of 1955 there was a total of 178 storage pools with 6746 active wells. Of these 178 pools, five were aquifer fields. Ten storage pools were under construction.

One-hundred and twenty-four compressor station provided 348,000 hp available for storage in 1955. This is an increase of 48,000 hp over the previous year.

Pennsylvania, West Virginia, Ohio and Michigan are still the four states in which most of the storage operations are carried on. Pennsylvania has taken the lead again in all the phases of storage operations with the other three close behind.

These four states had a total of nearly 271 MMcf in outputs for the year ending Oct. 31 or about 76% of the total outputs for all of the states. Pennsylvania alone had nearly 100 MMcf outputs.

The four leading states had nearly 68% of the maximum day output of all the states. The leader, Pennsylvania, had more than 1.5 MMcf output for one day.

Ohio Fuel says 7% increase "insufficient"

Ohio Fuel Gas Co. has appealed to the Ohio Utilities Commission from an ordinance of the City of Lorain fixing natural gas rates which would provide a 7% increase. The company wants an increase approximating 27%.

In appealing to the commission to establish a "just" rate, OFG said the rates fixed by the ordinance were insufficient to yield a reasonable return on the utility's investment.

The company has also asked the City of Columbus, where its present contract expires in November, for a 15% increase.

Validity of Ark-La's rate hike upheld by court

The validity of an application by the Arkansas Louisiana Gas Co. for a $4.3 million industrial rate increase has been upheld by the Arkansas supreme court. The state public service commission originally granted the increase.

The new opinion marked the second time the PSC's action was upheld by the high state court, but the order allowing the rate boost is currently under fire in Pulaski county circuit court on a different set of issues.

When the utility filed its proposed increased industrial rate schedule back in March 1955, it contained two escalator clauses to reflect changes in tax

COMBINATION REGULATOR *with* SAFE LIGHTING FEATURE

PUSH BUTTON

First again in gas control development, Thermac offers appliance manufacturers the most outstanding advancement in gas pressure regulators and safety control devices on the market today. The new "SL" Series shown is identical to the widely accepted Thermac "SR" Combination Regulator and Thermo-Electric Pilot, except that a safe lighting feature operated by a red push button has been added.

Appliance Manufacturers are invited to request samples of this new Thermac "SL" Series with the safe lighting feature. The simplicity of this control is extremely important, particularly to the customer in the field. Easy to use, easy to understand — no mystifying gadgets to complicate usage. Like all Thermac controls, the "SL" is positive in action — rugged and fool-proof in construction.

Write today for capacities, prices and SAMPLES of the "SL" Series. Available now in ⅜" and ½" sizes. Let us demonstrate to you Thermac's superiority of product and service.

SEND FOR SAMPLES

SIZES AVAILABLE TO HANDLE APPLIANCES UP THROUGH 250,000 BTU/HR.

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charges and the cost of gas purchased by the company. However, before allowing the new rates to go into effect, the PSC struck out the escalator clauses because the law prohibits "sliding scales and automatic adjustments" without a hearing.

Aluminum Co. of America contended, however, that the inclusion of the clauses in the application made the whole application invalid and consequently the whole rate proceeding invalid as it related to collection of the increased rates under bond.

The unanimous opinion handed down by the court said, "We refuse to hold that the public service commission is without power to eliminate the escalator clauses before approving the bond to allow the monthly consumption rate to go into effect. . . . Certainly if the commission can 'supervise and regulate' a public utility, it can strike the escalator clauses out of a proposed application before allowing the new rate to go into effect under bond . . .

"Certainly the commission had the right to determine that the escalator clauses here involved were not 'just and reasonable' so as to be put into effect under bond . . .

"There is nothing fatal to a petition for a rate increase merely because the petition asks for more than is to be allowed on preliminary hearing.

"To hold otherwise would be to take our present system of liberal pleadings back to the days of the old common law."

Alcoa's appeal was the second rejected by the court in connection with the utility's industrial rate increase. The court earlier denied an appeal by Monsanto Chemical Co. in an attack on the effective date of the increase which questioned the company's power to collect any of the increased rate prior to a hearing.

Issues involved in the case pending in circuit court include an 8% return allowed the company and prices it is allowed for the gas it takes from its own wells.

Twin Cities franchised to serve Washington areas

Twin Cities Gas Co. has the go-ahead from the Washington Public Service Commission to service areas in five western Washington counties.

The certificate of public convenience and necessity allows Twin Cities to operate in Mount Vernon and adjacent portions of Skagit county; McCleary, Elma, Montesano, Aberdeen, Cosmopolis and Hoquiam and adjacent portions of Grays Harbor and Thurston counties; Snohomish and Monroe and adjacent portions of Snohomish county; Longview, Kelso and Woodland, and adjacent portions of Cowlitz county.

The company presently operates in the Longview-Kelso area.

LeRoi plans $5.5 million expansion of facilities

The LeRoi division of Westinghouse Air Brake Co., which is celebrating its 40th anniversary this year, is launching a $5.5 million engineering and research expansion program at its Milwaukee plant.

In announcing the increased facilities, LeRoi general manager and vice president Paul I. Birchard indicated that the funds would be spent within the next five years. Already half a million dollars has been contracted for new laboratory facilities.

As part of the expansion, the division established a metallurgical section complete with lab facilities. The quality control department is also undergoing reorganization and widespread expansion of facilities.

The Milwaukee plant produces portable and stationary air compressors and internal combustion engines.

Study plan launched by Dominion Natural

Twenty-eight employees of Dominion Natural Gas Co. Ltd., Buffalo, N. Y., have been accepted for a comprehensive two-year gas industry training course.

Company President John R. Reeves says that A. M. Hove, chief engineer, will aid and supervise the men taking the home-study course. He will supplement the course with four seminars dealing with the company's methods, procedures and various codes.

The course was prepared by the Institute of Gas Technology in cooperation with the Canadian and American Gas Associations. Chemical, physical and engineering fundamentals are offered early in the course to aid those who have had no instruction in those subjects. The students then progress in logical sequence through gas production, conditioning, transmission and distribution. Economic and legal as-

Scenic Inch unearths dwellings of prehistoric man

CONSTRUCTION of Pacific Northwest Pipeline Corp.'s transmission line is serving a dual purpose: It is bringing natural gas to the Pacific Northwest area of the U. S. and adding immeasurably to archaeologists' knowledge of man's activities in the Northwest 10,000 years ago.

The 1487-mile route from the Southwest to the Canadian border crosses the cradle of pre-historic man in North America. Because of the cooperation and financial assistance given by Pacific, important discoveries are being made. Working alongside pipeliners are archaeologists, under the direction of Dr. Jesse Nusbaum, senior archaeologist for the Department of the Interior, who are surveying the land for surface evidence of underlying relics, and inspecting every foot of the trench in which the pipe is being laid.

This ancient dwelling unearthed by trenchers is a basal section of a pit house of the late basket-maker period about 650 AD. It shows central fire pit and adjacent deep cache pit, slab-walled storage cists and milling stones. The pole roofing of this ancient house was destroyed by fire long ago. Pipeline archaeologists excavated the site while the pipe was strung and welded overhead.

pects of certain gas industry operations are also included. Closing chapters contain information essential to business activities and problems of the natural gas industry.

Dominion Natural is sharing expenses of the training with each enrolled employee. Those who satisfactorily finish the course will be reimbursed by the company for their share of the enrollment fee.

"This new training program," said President Reeves, "will aid the company in developing local men for good supervisory positions . . ."

Withrow Die Casting moves into new quarters

The Withrow Die Casting Co., manufacturer of aluminum and zinc alloy castings, has moved into a new, greatly enlarged plant in North Hollywood, Calif.

The company is headed by Joseph Haber, president, and Curt Levinson, secretary-treasurer and sales manager, who acquired it in 1949. Lester Merchant is plant superintendent and Charles Maxim is purchasing agent. Ace Boultinghouse, head of Ace Engineering & Manufacturing Co., a Withrow subsidiary, will head a new machine shop for secondary operations.

Representing an investment in excess of $150,000, the new 18,000-sq ft structure contains facilities capable of doubling the company's current output.

Air conditioning service taught in regional schools

Seven regional training schools—in Dallas, Tulsa, Atlanta, Los Angeles, Brooklyn, Des Moines, and Columbus, Ohio—have been used to train 417 gas utility engineers and servicemen in installation and service of the Coleman gas motor air conditioning plant.

Tony Castello, technical service manager of the Coleman Co., and Irving Paeff, technical service engineer, directed the three-day schools. Utilities participating as hosts were Lone Star Gas Co., Oklahoma Natural Gas Co., Atlanta Gas Light Co., Ohio Fuel Gas Co., Southern California Gas Co., Brooklyn Union Gas Co., and Iowa Power & Light Co.

As explained by Clifford E. Hall, Coleman utility operations manager, the purpose of the schools was "to provide a strong nucleus of trained installers and servicemen upon which we can depend in the future as production of the gas motor unit expands to the point where it takes its place as a leading gas appliance."

Pictured at the opening of the Canadian Meter Co. plant in Milton, Ont., are (front row, from left) P. W. Geldard, president, Canadian Gas Association; A. McBeath, controller, American Meter Co. (parent company); J. W. Ostler, general manager, Canadian Meter. Back row: W. H. Dalton, general manager, Canadian Gas Association; and representing American Meter—W. B. Ashby, secretary; W. G. Hamilton Jr., president; and C. B. Dushane Jr., vice president-sales.

After conclusion of the second series of schools scheduled for next year, Coleman expects there will be 2000 to 3000 men in the industry capable of installing and servicing gas motor air conditioning.

Production of the unit is being limited in 1956 to the number that can be competently installed and serviced by trained personnel in the field. Mr. Hall said there now are installations in 41 states and Canada.

Undergraduate program spotlighted at IGT

Undergraduate instruction in gas engineering is moving into the spotlight at the Institute of Gas Technology, Chicago.

Until now, the education program was conducted at graduate levels, but Dr. Martin A. Elliott, IGT director, says "The objective is to train more men for the gas industry at the bachelor's level, where the most men are needed."

The undergraduates are enrolled in the gas technology option in chemical or mechanical engineering at Illinois Institute of Technology, with which IGT is affiliated. Instruction in gas technology is given during the junior and senior years in the classrooms of IGT.

Men taking the gas option are urged to accept summer employment in the gas industry, and all IGT scholarship and fellowship holders are required to take such work. This provides the students with practical experience to supplement their academic instruction, and shows them the utility of their studies.

The institute has invited gas industry companies to participate in the program as a means of securing trained employees. Under this plan a gas company selects from its own area a high school or junior college graduate, employs him in its plant to determine his adaptability, and then sponsors his enrollment in the gas option at Illinois Tech.

Some men are not able to go to college unless they receive financial assistance. The amount of support and financial incentive which a company will offer, in the form of a scholarship or fellowship (the latter includes a stipend to help meet the cost of living), is something which can be determined by the company alone. If the selected man qualifies academically for one of the 20 scholarships offered annually by IGT, he may apply for an IGT scholarship.

The Peoples Gas Light & Coke Co., Chicago, is the first to enter fully into the plan. It has granted two $1000 scholarships for the coming academic year, and will employ the recipients for summer training.

Companies which will participate to the extent of employing eight IGT scholars and one fellow this summer are: Boston Gas Co., Houston Natural Gas Corp., Natural Gas Pipeline Co. of America, Northern Illinois Gas Co., and Panhandle Eastern Pipe Line Co.

"The feature of this plan that should make it attractive to all employers in this age of intense industrial competition for engineers," said Director Elliott, "is that it allows a company to select a local boy, acquaint him with its operations, and in all probability secure him as an employee upon his graduation. We will welcome participation by additional gas industry companies, regardless of whether they are institute members."

New company proposes gas service to Illinois areas

Vulcan Gas Co. of Mount Vernon, Ill., is proposing to supply natural gas to 12 Illinois communities.

According to O. F. Holdren, who organized the company last year, and R. H. Anderson, company engineer, the firm has obtained 25-year franchises from Lebanon and Mascoutah in St. Clair county and Aviston, Trenton, New Baden, Albers, Germantown and Bartelso, all in Clinton county. It is seeking franchises in Carlyle, Beckemeyer and Breese and proposes to serve the Alton Box Board Co. and a number of other industrial plants.

Mr. Anderson said the program calls for construction of 32 miles of transmission lines and a complete distribution system in each community. Natural gas will be bought from Texas-Illinois Pipeline Co., whose 30-in. Texas-to-Chicago line passes near Carlyle.

Applications will be made to the Illinois Commerce Commission and the FPC for operating certificates.

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Kaiser's steel expansion largest for West Coast

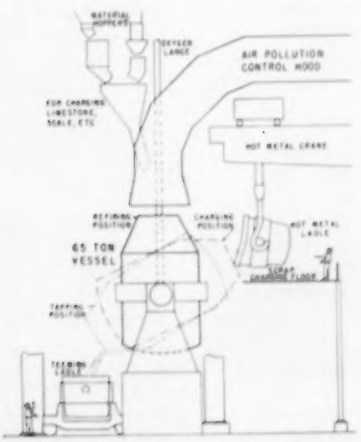
Jack Ashby

Medium and large diameter, thin-wall pipe that finds prime application in gas distribution and transmission piping systems is in tighter supply right now on the West Coast than it ever has been. This fact played an important part in planning by Kaiser Steel Corp. that resulted in the recent announcement of an expansion program that will be the largest single industrial expansion in the history of the West Coast.

The project, a $113 million expansion of Kaiser Steel's Fontana, Calif., steel mill, was made public by Jack L. Ashby, vice president and general manager, Kaiser Steel Corp., Oakland, Calif., at a news conference held in Los Angeles during May. Construction was scheduled to start at once.

Highlight of the plant design features is the installation of an oxygen steelmaking plant—the first of its kind in the West. Output from this unit will augment the steel production of the nine open hearth furnaces now in operation at Fontana. The oxygen steelmaking unit is charged with molten metal and scrap. High purity oxygen is then blown directly on top of this molten metal bath for about 20 minutes. The ensuing chemical reaction refines the metal scrap and molten pig iron into high quality steel.

G. B. McMeans, vice president in charge of operations for Kaiser Steel, explained that oxygen steel is equivalent in every respect to conventional



Highlight of Kaiser's new plant is the installation of an oxygen steelmaking plant, the first of its kind in the West.

open hearth steel, but has the additional advantages of (1) low initial investment cost, (2) high production rate per hour, and (3) low operating costs.

The completion of the expansion program will see the addition of a slabbing mill for initial rolling of ingots, other changes and additions to increase output in the hot strip mill, plate mill and tin mill, in addition to the oxygen steel unit. The operation is expected to be completed in early 1958. Then, production of finished steel products will be increased from 1084 thousand tons to 1528 thousand tons per year. It means western steel consumers will have more tin plate, steel plate, steel sheet, and structural steel available from their area.

Kaiser's line pipe will still be fabricated at its Napa, Calif., plant. This plant has rolled pipe for a major portion of the Pacific Northwest Pipeline Corp.'s "Scenic Inch" pipeline and many other important pipeline projects.

Bryant relocating Indianapolis facilities

Bryant division of Carrier Corp. has begun construction of an administration and engineering research building at its national headquarters in Indianapolis.

In making the announcement, Ronald N. Campbell, Bryant general manager, said, "In addition to providing much-needed general office space, the new building will enable us to conduct one of the most comprehensive sales and engineering training programs in the heating and air conditioning industry."

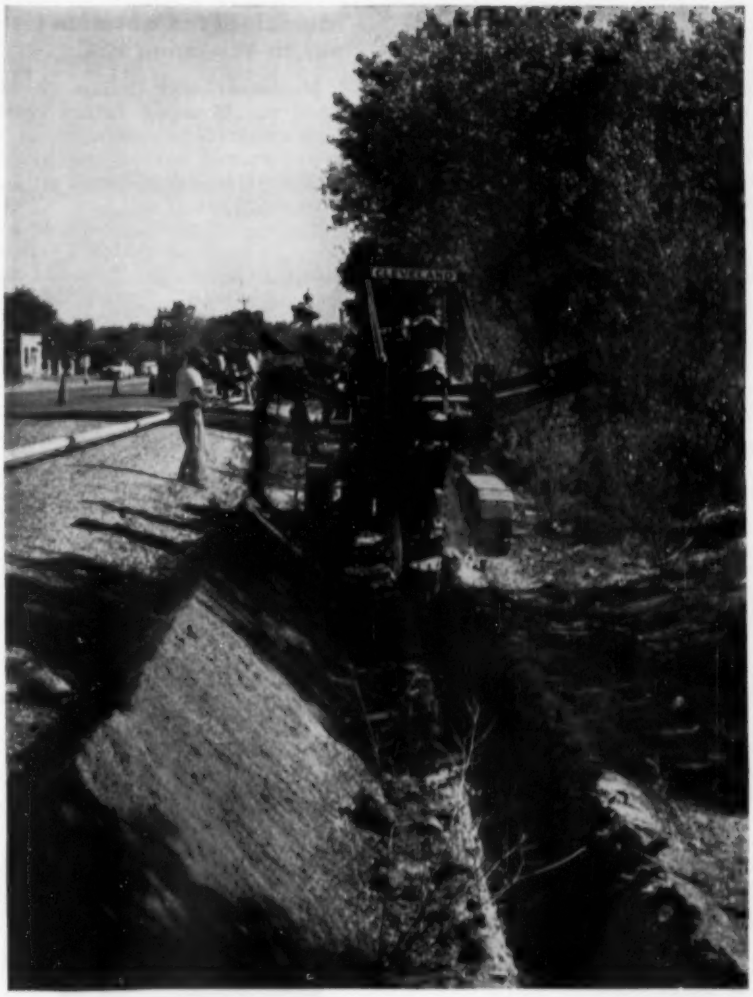
The new facilities, which will be located near the plant site on the west side of Indianapolis, involve remodeling and additions to an existing building.

A large portion of the new building will be devoted to research and development. General management, sales, engineering and financial personnel will also be housed in the new facilities, which are scheduled for completion by Aug. 31.

Type B gas vents subject of GAMA pamphlet

Type B gas vents, which can be used instead of masonry chimneys in homes to be heated by gas, are the subject of a new pamphlet prepared by a group of vent pipe manufacturers who are members of the Gas Appliance Manufacturers Association.

Chester Blome, of the Metalbestos division of William Wallace Co., and



THE RIGHT COMBINATION of conveyor, digging wheel and crawler speeds—from more than 33 usable combinations available in the Cleveland Model 110 Trencher—permits spoil to be deposited exactly where desired alongside this narrow, 30-inch deep trench. This "110", shown trenching for a 4-inch main north of Albuquerque, N. M., is one of many Clevelands currently operated by the Southern Union Gas Company, Dallas, Texas, in gas distribution work on its Arizona, New Mexico and West Texas systems.

THE CLEVELAND TRENCHER CO.

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

Good Everywhere

chairman of the manufacturer group, said the pamphlet has been issued to meet a rising demand on the part of builders for factual information about such vents. He said the trend to gas heat in new homes has stimulated builder interest in the Type B vents, which are specifically engineered for use with gas-burning appliances and equipment.

Copies of the pamphlet are available from GAMA, 60 E. 42nd St., New York 17.

Municipal tax question put to Wyoming PSC

Montana-Dakota Utilities Co. has asked the Wyoming Public Service Commission for permission to pass on to its consumers taxes imposed by municipalities on the company's gas and electric facilities.

The city of Sheridan recently imposed a city tax of $15,000 a year on Montana-Dakota's gas setup and the same amount on its electric facilities. The electric operations are also charged 1% for use of streets and alleys.

In asking for permission to pass on such taxes to the consumers within the municipality in which the tax is levied, Montana-Dakota said that for the 12 months ending last March 31, it had a net earnings on its rate of return for its gas operations of 5.19% and the new rate schedule would provide 7.07%. It also said it had a deficiency of $26,602.67 on its gas service.

Majority of trenching done by hand, survey reveals

A current survey of over 200 operating gas utilities throughout the United States revealed that 9 out of 10 of the distribution companies dig at least one-third of their main and service trenches by hand. The average cost, nation wide, of this hand-trenching is $0.60 per foot. Some companies, according to Howard Worthington of the Charles Machine Works, Perry, Okla., have found that hand dug trenches cost up to $3.50 per foot.

The survey—released to *GAS* this month—indicates that two-thirds of the reporting utilities own their own mechanical ditching equipment and the cost per foot of their trenching operations runs just about one-half of the national average thus established. Contract ditching was reported to cost about 40% more than the average cost to companies owning and operating their own mechanized trenching equipment. The average cost of contract ditching to companies participating in the survey was $0.35 per foot, with the highest reported cost as $0.80.

Companies owning their own trenching machinery showed an average cost of $0.25 per foot, with the highest reported cost as $0.75.

Fibercast Corp. plans full-scale operation

According to a recent joint announcement from George McCuskey, Youngstown, Ohio, president, and H. D. Boggs, general manager, the Fibercast Corp. of Sand Springs, Okla., will undergo an extensive expansion and improvement program that will change the present operation from "pilot" status to a full-scale commercial plant.

Fibercast process is a centrifugally cast epoxy resin reinforced with braided glass sleeve. It has been under test for more than 18 months. The tests show the pipe is capable of withstanding temperatures of —65° to +260° F and has a working pressure ranging from a vacuum to 1000 psi. Plans call for the manufacture of Fibercast pipe in standard iron pipe sizes of 2⅜-,

Here's Briggmann

..CARBIDE'S CARBOSEAL Anti-Leak man, with the answer to leakage due to dried-out fiber packing in bell-and-spigot joints.

Many gas companies have learned from George Briggmann that *CARBOSEAL Anti-Leak is:*

- effective
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Let George give *you* the details. Write for Booklet 4506, or better still, the 16 mm. color-sound movie, "CARBOSEAL Anti-Leak Stops Gas-Main Leakage." You'll profit by it.

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2⅞-, and 3½-in. OD. It will be available in threaded, welded or flanged connections and will have available 96 types of fittings.

Cost of the expansion program has not been revealed, but Mr. Boggs says it will increase the output 10 times over present production and will almost double the payroll. Construction of the new building will begin within a few weeks and increased production will start within six months. Full production is scheduled to start within 10 to 12 months.

Big expansion job underway for Hartford Gas Co.

The Hartford (Conn.) Gas Co., in the midst of one of the largest expansion programs in its history, is installing a completely new distribution system in the heart of Bloomfield, Conn.

The new 6-mile main runs through the center of the city and continues on to the new industrial area in the southeastern portion. Part of the new installation is 12-in. in anticipation of future consumer needs toward West Hartford.

Among new industrial customers are Connecticut Packing Co., and Smyth Manufacturing Co., which will use large quantities of gas for industrial processing.

NEWS NOTES

Both corporate and consolidated net income of Peoples Gas Light & Coke Co., Chicago, were greater in the first quarter of 1956 than during any previous similar period, according to the quarterly letter to stockholders from Chairman James F. Oates Jr. He said that quarterly net income, on a consolidated basis, was $6.18 a share compared with $5.28 at the same time last year. Corporate income went to $5.10 from $4.37 a share.

Mueller Co., Decatur, Ill., was one of 106 companies recognized as a charter member of the United States Chamber of Commerce at the group's 44th annual meeting held recently. W. H. Hipsher, executive vice president of Mueller, is the national councilor representing the Decatur Association of Commerce. He also represents the Illinois Manufacturers Association.

Fisher Governor Co., Marshalltown, Iowa, has appointed J. G. Chilcoat & Co., Pittsburgh, as exclusive sales representative for western Pennsylvania and West Virginia.

working height only 7 FEET-4 inches

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Overall height (digging) 7'4"

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Trench widths from 16 to 26"

Maximum digging depth 8'0"

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Down-crowd boom (undercuts walks, curbs and gutters — makes vertical set-ins)

Self-sharpening, reversible "Tap-In" teeth

Power-shift spoil conveyor, reverse-direction belt (discharges to either side)

Dual-purpose friction clutch (drives bucket line, serves as automatic safety to protect against shock loads)

Full crawler mounting, with 12" flat shoes or 16" grouser type treads

Low ground bearing pressure (only 4.6 to 6.1 lbs. PSI overall length on crawlers)

Choice of engine (gas or diesel power available)

For work and travel in restricted operating areas, take a look at the low overhead clearance and narrow width of this new, small, ladder-type Trenchliner. It's compact, light in weight — yet brings you a big "plus" in digging widths, depths and speeds. Check its work capacity and heavy-duty features listed here — then ask your Parsons distributor to demonstrate what this utility-size 155 can do for you.

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Gas Digest

A digest of what's new in products and trade literature compiled by the editors of GAS as a reader service.

New Products and Trade Literature

For more data on any of these items use the Readers' Service Card on pages 85, 86

1. Radiophone

An entirely new circuitry concept is used in Motorola's new Private Line radiophone which, according to the company, effectively provides private interference-free mobile communications.

Private Line radio is designed specifically to maximize communications efficiency under congested channel conditions, and to eliminate operator fatigue, missed and misunderstood messages, and passenger annoyance. Nuisance noise and undesired transmissions from other systems cannot unlock the speaker.

Motorola Communications & Electronics

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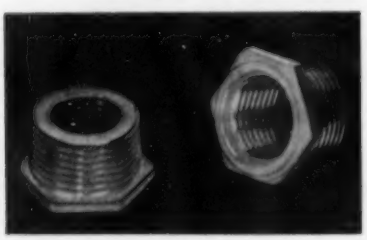
2. Dual-purpose engine

A dual-purpose engine which serves not only as the machine's power unit but also furnishes air for operating jack hammers, air spades, tampers, and similar tools, is now available with Bucyrus-Erie's Model H-3 Hydrocrane-Hydrohoe.

The six-cylinder engine, offered as an option, replacing the machine's regular power unit, works this way: three cylinders of the six are used to develop power—the other three serve as a compressor delivering air at the rate of 120 cfm at 100 psi.

Bucyrus-Erie Co.



3. Dielectric bushings

Two new sizes have been added to the May Co. line of nylon dielectric bushings for use on gas heaters, meters, ranges, water heaters, or wherever dissimilar metals are joined, to prevent electrolysis damage.

Available in sizes ½- x ⅜-in. to 1½- x -1¼-in., the bushings are made from Plaskon virgin nylon that withstands temperatures in excess of 300° F. Any type of dielectric fitting can be made by inserting a Mayco dielectric bushing into an ordinary threaded pipe fitting.

May Co.

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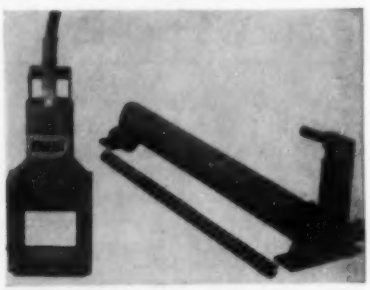
4. Matchless range

Three 36-in. matchless ranges have been added to the Florence Stove Co. line.

One model (64178) features a burner equipped with the Florence Governess thermostatically controlled burner. Other burners are Harper-Wyman center simmer Alltrol burners with Microlite pilots. The low broiler is equipped with removable oven glass and light. Grates are porcelain in charcoal gray and the range is trimmed in copper and chrome.

Florence Stove Co.



5. Hydraulic tool

Regent Jack Manufacturing claims that its new hydraulic tool can be used in seven different ways to simplify and speed up gas line repair and maintenance.

Known as the Regent Flow Stop pipe squeezer, the tool is available in two models for use on pipe having inside pressures up to 100 psi. It consists of an hydraulically operated ram and a pair of jaws that clamp around the pipe. Pressure of the ram against the jaws compresses the pipe until flow is shut off.

The Flow Stop may be used in relocating service lines and mains, in repairing leaky or ruptured lines, in speeding up trenching operations, in shutting off service to buildings in

emergencies when valves are inaccessible, and as a line-up clamp in welding pipe.

Regent Jack Manufacturing Co.

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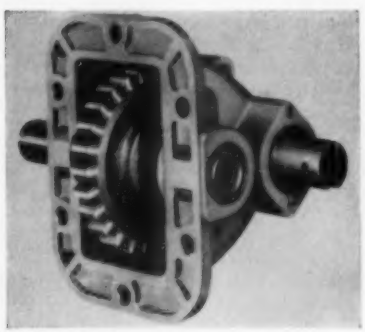
6. Appliance tester

Goldak Co. has designed a new gas appliance tester to assist servicemen in checking and testing thermocouples, magnetic valves, and thermostats.

The G-6 is capable of reading the millivolt output of thermocouples and pilot generator sets from 0 to 1000 millivolts. It can be used as a millivolt "driver" or generator to replace the thermocouple and thereby test the electromagnets for "pull-in" and "drop-out" points. Controls include output jacks for both ac and millivolt ranges; a master on-off selector switch which makes the unit read millivolts one way and generate millivolts in the other position; a range switch with 0 to 100 and 0 to 1000 millivolt positions; and a low resistance potentiometer permitting continuously variable adjustment from 0 to 1000 millivolts.

Goldak Co.



7. Power take-offs

A new series of lightweight, medium duty power take-offs has been added to the Tulsa Winch line.

Designated Series 22, the new take-offs incorporate special features designed to appeal to the large and diversified market for medium duty power take-offs. Manufactured in nine different models to accommodate all popular transmissions, the entire line offers die-cast aluminum housings for extra lightness and strength; three optional output shaft sizes—shafts rotate on needle bearings; hardened shaved gears that mesh with transmission only while take-off is operating; heavy duty oil seals; and optional cable or level control.

Tulsa Winch

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8. Hot-tap valve

In addition to hot-tap applications, the Hanby hot-tap valve from Oil Well Supply serves as a blowdown valve for scrubbers and drips.

It features full 1-in. opening with 2-in. valve structure. The weld-nipple can be furnished in any length needed. As a blowdown valve on drips or low places in the line, the internal threading permits the use of a 1-in. syphon to the bottom of the pipe.

Oil Well Supply Div.

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9. Remote gauging system

A new remote tank gauging system, one of the Bendix Electro-Span systems, remotely measures liquid levels in tank farms of any size over a single wire-pair of any length leading to the tank farm area.

The operator of the tank gauge receiver selects the tank he wishes to measure, causing the selected tank to begin automatically to transmit data. The tank number then lights up in a group of lamp registers on the left of the panel. Almost instantly following this, in light register groups to the right, a reading of the liquid level in the tank in feet, inches and fractions of an inch will appear.

This new simplified digital gauging system will read liquid levels to 64 ft in 1/8-in. increments.

Bendix-Pacific

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10. Meter bars

Eclipse Fuel's rigid meter bars are now available with Wedgeseal insulating unions for all tin, aluminum, and iron case meter installations. Non-insulated meter bar sets can be modernized with these unions, which are interchangeable with older types and have been specially designed to stop electrolytic corrosion of mains and services.

Jumping or shorting of induced or stray house currents across the union is, according to Eclipse, eliminated by the Wedgeseal insulator which extends over the flange and washer face.

Eclipse Fuel Engineering Co.

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11. Valve actuator

Ledeen Manufacturing's Quad Actuator has been built to operate high-pressure plug and ball valves up to 36 in. in size.

Features claimed are balanced torque

delivered to valve stem through four-cylinder operation; completely separate oil and gas systems, and no gas-oil interface. For periodic testing, detachable lever permits operation of actuator and controls without turning main valves. The actuator is available in a wide range of torque capacities with a variety of control systems.

Ledeen Manufacturing Co.

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12. Top burner

A new super-speed top burner has been developed by the Geo. D. Roper Corp. Called the Rocket-Speed, the new burner is now available on two gas ranges of the 40-in. Roper Super Deluxe series.

The Rocket-Speed will also be used in combination with one Roper Tem-Trol fully automatic top burner and two Super Alltrol Center-Simmer top burners.

Geo. D. Roper Corp.

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13. Vibration monitor

Beta Corp. is producing a new vibration monitor which anticipates and prevents trouble in rotating and reciprocating machines by responding to slight increases in roughness or vibration and causing a shutdown before a failure occurs.

Applications of the Model 5 Vibraswitch malfunction detector include pumps, motors, compressors, blowers, gas engines, diesels, centrifuges, turbines, generating equipment, and test stands. It may be used singly on small equipment, in pairs on driving and driven equipment, or in series or parallel combinations to monitor each bearing.

Beta Corp.

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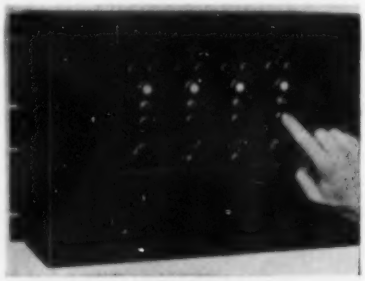
14. Winter air conditioners

A new line of gas-fired counterflow winter air conditioners from the Airtemp division of Chrysler Corp. has been designed for slab-type homes and any perimeter heating system.

The new units, ranging in size from 65,000-100,000 Btu output, are approved for zero-clearance installation, making them suitable for closet or alcove installation. Narrow width permits passage through all standard doors without crate removal.

Airtemp Div.



15. Control system

Motorola's new supervisory control system has been designed to provide centralized control for pipeline pumping stations, off-shore gathering installations, electric power stations, and railway systems.

With Type DOS-3 equipment, one operator can supervise and control many valves, pumps, motors, generators, or any other devices which can be operated electrically. The new equipment is available in two ultimate capacities, 25 and 50 points.

The new system, with combined "select-and-operate" control and automatic interrogation indication is designed to permit serving many remote stations economically.

Motorola Communications & Electronics

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16. Built-in range

A new high-speed built-in range top is in production at Caloric Appliance Corp. Model BR-2 is a drop-in unit with two burners which will fit any known kitchen cabinet base.

Two, three, or more units may be installed to provide four- or six-burner or even greater cooking capacity. The unit is available in either satin chrome finish or in fresh porcelain enamel colors.

Caloric Appliance Corp.

---

17. Perforated-tape storage

A new refinement in office automation, a method of housing and indexing strips of perforated paper tape and edge-punched cards to save time in common-language data-processing operations, has been announced by Remington-Rand.

The method is a simple adaptation of Kardex, the visible-record system. The standard size Kardex pocket can accommodate both 5- and 8-channel tape. The tape is fitted into a holding card in the Kardex pocket, and the information coded in the tape is printed on the body of the holding card for identification purposes. Several folds of tape can be comfortably housed, and as many as three separate tapes may be stored in the same pocket.

When edge-punched cards are used instead of tape for recording non-variable master information, they can be inserted into the Kardex pocket either vertically or horizontally, depending on their size.

Remington Rand.

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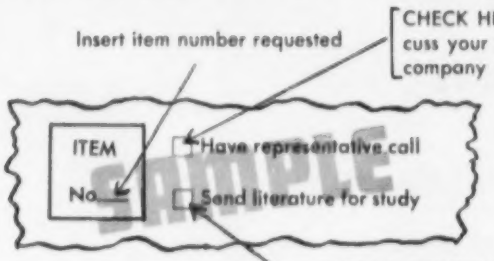
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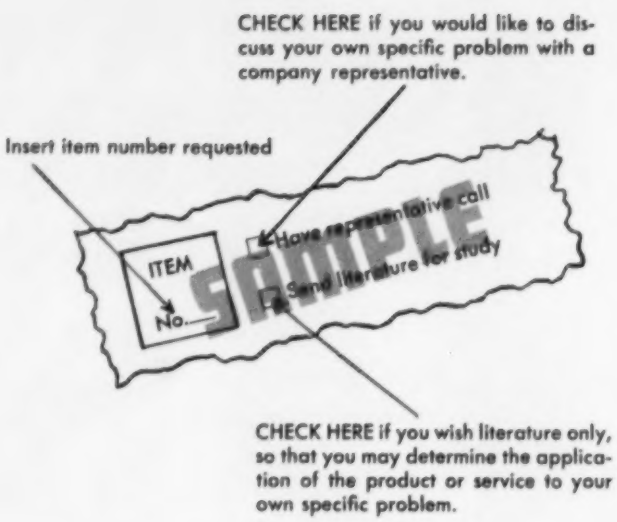
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TRADE LITERATURE

18. Generator booklet

A new booklet on inert gas generators has just been published by Roots-Connersville Blower Div. It should be useful to those who use such equipment or are considering means of protection against fire and explosion hazards. In addition to detailed drawings, photographs, capacity and dimension tables, the booklet contains a novel and useful information sheet.
Roots-Connersville Blower Div.

19. Insulator bulletin

T. D. Williamson's new Style 4 Thinsulator is described in a new four-page bulletin. Illustrated are the pipeline casing insulator's features, which include compactness, ruggedness, ability to withstand high dynamic and static load capacities.
T. D. Williamson Inc.

20. Computer brochure

Librascope's new pressure compensated, totalizing flow computer is described in a new brochure which features illustrations, detailed specifications and applications of the flow computer for use in any situation calling for the orifice measurement of gas.
Librascope Inc.

21. Drive booklet

Multi-color tables for easy selection of variable speed Texrope drives are contained in a 44-page booklet from Allis-Chalmers. In addition to the selection tables, the booklet contains information on design features, drive principles, hp rating tables, a speed range table, and accessory equipment.
Allis-Chalmers Manufacturing Co.

22. Turbine drive bulletin

Construction and design features of turbine drives for centrifugal compressors and blowers are covered in detail in a new General Electric bulletin (GEA-6232) on high-speed mechanical drive turbines. Cross sections, schematic drawings, cutaways, and typical installation photos point out design features and applications in the 26-page bulletin.
General Electric

23. Power plant booklet

Caterpillar Tractor's new 16-page booklet, "Cat Electric Sets for Power and Protection," shows many uses to which these power plants can be put. Cutaway drawings and photographs are used throughout the booklet (No. 31922). Also shown are new Caterpillar generators. The booklet is available in English, French, Spanish and Portuguese.
Caterpillar Tractor Co.

24. Fitting literature

Le-Hi hose fittings for mining, tunneling, contracting, quarrying, construction or wherever compressed air is used are described in a new eight-page bulletin from Hose Accessories Co. Bulletin 10 contains complete information on sizes and part numbers.
Hose Accessories Co.

25. Valve catalog

Honeywell's V80 gas valve is the subject of a new catalog page of specifications and ordering information. The sheet is punched to fit into a loose-leaf catalog.
Minneapolis-Honeywell Regulator Co.

26. Computer catalog

The ALWAC III-E, newest in the ALWAC series of general purpose electronic digital computers from Logistics Research Inc., has been designed for a wide range of application in scientific-engineering-research and business-industrial-financial organizations. An eight-page two-color brochure outlines the computer's special features, applications and operations.
Logistics Research Inc.

27. Tape catalog

Full information on the anti-corrosion tapes manufactured by Polyken is contained in a 25-page, two-color catalog. The illustrated catalog explains the tape method of application to pipe, and the nature of corrosion and its control are discussed. A section is devoted to specifications, surface preparations, taping and wrapping, inspection, repair, and special wraps for welded pipe. Pipe coverage data are also given for all widths of tape.
Polyken Sales Div.

28. Insulation catalog

A new catalog, "Johns-Manville Insulations," presents 20 pages of information on J-M thermal insulations and refractories for general industrial applications. Organzed for quick reference work, the catalog provides information on the composition, physical and thermal properties and sizes of the various products.
Johns-Manville

29. Switch bulletin

Control and transfer switches for low voltage applications up to 60 v a-c or d-c are described in a new 28-page bulletin from General Electric. The bulletin (GEA-4746B) includes photos, drawings, cutaways and discussion of special features. Application data, representative contact diagrams, and ordering directions are also contained.
General Electric Co.

30. Control catalog

General Controls new automatic heating controls catalog contains many new items, including a complete line of oil, coal and electric heating controls, plus the latest improvements and changes in the G-C line of gas heating controls. Also listed are the locations of the company's five plants, seven warehouses, and 42 factory branch offices.
General Controls Co.

31. Electric systems

"An Introduction to the Automotive Electrical System" is the title of a new sound slide color film released by Delco-Remy. Both the film and the descriptive booklet accompanying it are basically fundamental and non-technical and are intended for individuals who wish to become acquainted with the electrical units that make up the electrical system of a modern automobile.
Delco-Remy Div.

52. Control bulletins

A new gas control (No. 55) is described in two six-page bulletins from A-P Controls. Each bulletin (G-170 and 170A) provides full information on the design and construction of the control. Mechanical specifications, dimensions, design details and capacities are supplied.
A-P Controls Division

GAS people

Promotions

ALEXANDER M. BEEBEE is the newly elected chairman of the board and chief executive officer of Rochester (N. Y.) Gas & Electric Corp. Succeeding him as president is ROBERT E. GINNA, who has been executive vice president since 1950. The company has also elected LINN B. BOWMAN to the newly created position of vice president in charge of gas and transportation.

Several promotions have been announced by Mississippi Valley Gas Co., Jackson, Miss. CHARLES M. BROAD advances from general sales manager to vice president in charge of sales; F. M. FEATHERSTONE JR. from secretary-treasurer to vice president and secretary-treasurer; J. H. LAMBDIN from general superintendent to vice president and general operating superintendent; W. W. POINTER JR. from assistant secretary to secretary and assistant treasurer; and A. A. WOOLDRIDGE from assistant treasurer to assistant secretary and assistant treasurer.

FRANCIS E. DRAKE JR. has been promoted to manager of the rate and economic research department of Rochester (N. Y.) Gas & Electric Corp. The company has also promoted FOSTER B. BURNETT to assistant manager of that department.

WALTER R. BORIS has been elected secretary of Consumers Power Co., Jackson, Mich., succeeding ARCHIE J. MAYOTTE, who has retired after 39 years with the company.

Several changes have been made by Public Service Electric & Gas Co., Newark, N. J. JEAN H. MILLER has gone from plant design engineer to distribution design engineer; FREDERICK ULLRICH from statistical engineer to plant design engineer; FREEMAN A. LOHR from engineer, Harrison gas work, to statistical engineer; CHARLES W. BEGGS from project engineer to senior engineer. JOHN F. O'NEILL has been promoted to division service engineer, Passaic division gas distribution department, and JOHN SELBACH to district superintendent of the same division. HOWARD HOFFMAN JR. is plant operating engineer at west end gas works, Jersey City, and WILLIAM T. ROBINSON JR. is plant production engineer at the same works.

BERNARD E. GALLAGHER and GERALD R. HADDEN are new assistant vice presidents of Consolidated Edison Co. of New York. Mr. Gallagher has been assistant to the president of Con Edison since 1954 and Mr. Hadden has been assistant manager of the company's station construction and shops department.

The Superior (Wis.) Water, Light & Power Co. has named L. A. NICHOLS vice president and general manager. Mr. Nichols, who joined the company in 1935 as sales engineer, has been vice president since 1952.

JOHN A. LAMMERT, who has held positions in Peoples Natural Gas Co.'s land, personnel, sales and distribution departments, has been appointed manager-new building promotion for the Pittsburgh company.

JOHN W. OWEN has been promoted from director of operations and sales to general manager of the Tampa (Fla.) Gas Co.'s west coast division, replacing ALVIN H. STACK, who has been named administrative consultant. T. J. WATKINS is now district manager of the North Miami office, east coast division, replacing SAM H. EWING, who has been promoted to director of public relations of Peoples Water & Gas Co., North Miami.

C. M. TURNER, vice president, has been elected to the board of directors of Cincinnati (Ohio) Gas & Electric Co.

E. B. Patterson **H. B. Kirk**
Southern Counties

Southern Counties Gas Co., Los Angeles, has announced the appointment of EDWARD B. PATTERSON as Orange county division sales manager and HAROLD B. KIRK to succeed him as manager of the natural gas bureau—a sales activity of both Southern California and Southern Counties Gas companies. Mr. Patterson replaces H. W. ANDERSON, who has resigned.

WILLIAM H. MUCHNIC, president of Locomotive Finished Materials Co., Atchison, Kan., which merged with Rockwell Manufacturing Co. recently, has been elected a director of Rockwell.

LEWIS R. GATY has been elected vice president in charge of research and development for Philadelphia (Pa.) Electric Co.

The following executive changes have been announced by Consolidated Natural Gas Co., New York: WILLIAM A. DOUGHERTY, director, vice president and general counsel since 1943, is chairman of the board; E. H. TOLLEFSON is a vice president in charge of planning and managing the system's gas supply; HERBERT C. JOHNSON was elected vice president and treasurer and will be chief financial officer of the company. Other changes were the election of ARTHUR E. GARTNER to the new office of controller, appointment of WALTER C. KRONKE as assistant controller, and JOHN C. STANSBURY and MALCOLM S. LONON as assistant treasurers.

A. M. Beebee **R. E. Ginna**
Rochester Gas

L. B. Bowman **W. A. Dougherty**
Rochester Consolidated

E. H. Tollefson **H. C. Johnson**
Consolidated Natural

David Kerr

S. M. Holland

Southern Union

DAVID J. KERR has joined Southern Union Gas Co., Dallas, as director of business development, a newly created administrative post. Most recently, Mr. Kerr served as assistant to the executive director of the Natural Gas and Resources committee in New York. He had previously been associated with Gulf Interstate Gas Co. and H. C. Price Co.

SAMUEL M. HOLLAND has succeeded PAUL E. NICHOLLS as district manager of Southern Union Gas Co.'s distribution system in Galveston. Mr. Nicholls has retired after nearly half a century in the gas distribution business in Galveston. Until his recent promotion, Mr. Holland was general superintendent in Galveston.

Utility Appliance Corp., Los Angeles, has promoted STANLEY F. SKAFTE to the newly created post of director of engineering for all of the company's products. Mr. Skafte, a director of the company, was formerly director of sales for the heating and air conditioning division.

ROBERT F. HARWICK has been promoted to manager of the western region of DuPont Co.'s Petroleum Chemicals division with headquarters in Los Angeles. GEORGE L. TYLER becomes assistant regional manager. WILLIAM B. GEST will manage the newly formed Cleveland, Ohio, district.

JOHN A. HILLER, vice president, has been elected vice president and general manager of the Portland (Maine) Gas Light Co. He succeeds CHARLES D. FULLERTON, who retired after 47 years of service with the company.

J. H. BARTLEY, a veteran of 32 years with the company, has been named controller of Iowa-Illinois Gas & Electric Co., Davenport. He succeeds C. P. VAN DYKE, who retired on April 1.

CHARLES E. WARSAW has retired as vice president of United Gas Improvemen Co. Luzerne Electric and Gas division. He is succeeded by JAMES L. BROWNLEE, at present manager of elec-

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"I use the 524T Pow-R-Ditcher for plastic and steel oil lines, digging under severe soil conditions. To date I've dug 35,000 feet with no repair cost. Does an excellent ditching job."

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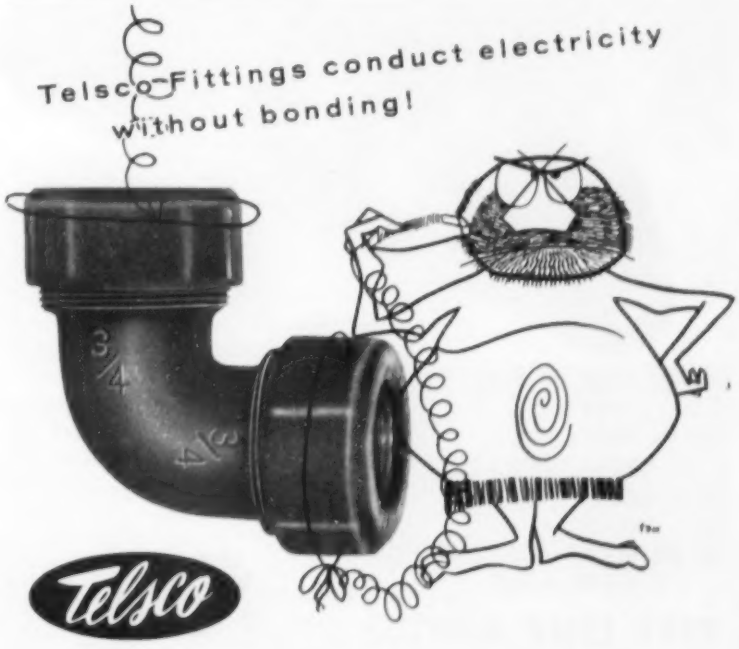
Dwyer's Ditching Service
Wellington, Kansas

Pow-R-Ditcher Is Ideal For Foundation Footings, Gas, Water and Sewage Lines

Thousands used by contractors, municipalities, utility companies, custom operators, etc. Digs 8" to 24" wide, down to 6' deep, at 1' - 15' per minute. Self-propelled. One man operated. Low cost. Smaller models also available. Write for complete information.

Some Excellent Distributor Territory Available.

VERMEER MFG. CO., Pella, Iowa



TELSCO FITTINGS DIVISION

5420 REDFIELD STREET **DALLAS 35, TEXAS**

tric distribution and gas department of the Luzerne division. Mr. Warsaw began his career with UGI in 1923 in Kingston, Pa.

WENDALL W. FERTIG has joined Ball Associates as mining engineer consultant and minerals division chief in the Denver, Colo., office.

FRANK KOVICH is now general manager of the Milwaukee (Wis.) Valve Co., a subsidiary of Controls Corp. of America. Mr. Kovich is also vice president of Controls Corp. and director of manufacturing of the A-P Controls division.

HOWARD J. GOSS has been promoted to sales manager of Harper-Wyman Co., Chicago. Mr. Goss, who joined the company in 1938, has been assistant sales manager since 1950.

The newly created position of manager of manufacturing for all of Bryant Division's plants is GORDON N. GRAY, who has been plant manager of the headquarters plant at Indianapolis since 1953. Other Bryant appointments include BOB MC ELWAIN, southeast regional sales manager, headquartering in Atlanta, and ROBERT R. GOOD, regional representative out of Dallas.

G. N. Gray
Bryant

H. J. Goss
Harper

CHARLES L. HOLBERT, who joined the company earlier this year as a vice president, has been appointed executive vice president of H. K. Porter Co. Inc., New York. He succeeds CLARENCE R. DOBSON, who has retired.

JACK CROWLEY, who has been sales manager for the past seven years, has been elected vice president in charge of sales of Greenwich (Conn.) Gas Co. Mr. Crowley was first associated with Greenwich in 1938 and 1939.

RALPH D. STAUFFER has been elected president of the NEGEA Service Corp., Cambridge, Mass. He was formerly vice president and chief engineer and director of electric operations for the service organization.

ARNOLD B. WHITE has joined Carrier Corp., Syracuse, N. Y., as coordinator of engineering standards, and VERE L. HUNT has been named credit manager.

HERBERT H. ROGGE has joined ACF Industries Inc., New York, as executive vice president. Until this time, Mr. Rogge's business career had been spent with Westinghouse Electric Corp. and Canadian Westinghouse Co. Ltd.

JAY PAUL WADE, a senior account executive with Bozell & Jacobs, New York, has been named manager of public relations for Central Illinois Public Service Co., Springfield.

GERALD J. BAYERN has joined the Barrett division, Allied Chemical & Dye Corp., New York, as marketing and economic analyst.

HUGH C. DALY has been elected executive vice president of Michigan Consolidated Gas Co., Detroit. Mr. Daly joined Michigan Consolidated and its affiliated companies as assistant

AN-SPEC

COMPLETE CATHODIC PROTECTION

- COMPREHENSIVE SURVEYING
- EXPERIENCED ENGINEERING
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- CONSTRUCTION KNOW-HOW

You can expect the best results only by using the complete services and quality products of a company specializing in cathodic protection. You will get the best results when you call in AN-SPEC anode specialists. They furnish every service and highest quality anodes — complete cathodic protection.

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ANODE SPECIALISTS
AN-SPEC

Hugh Daly
Michigan

H. A. Diekmann
No. Illinois

secretary in 1950. He has been a vice president and director of the company since 1953.

Northern Illinois Gas Co., Bellwood, Ill., has named HENRY A. DIEKMANN to the post of vice president in charge of sales and advertising and HOWARD E. FORD as assistant to the president.

Honors

N. C. MCGOWEN, president and chairman of the board of United Gas Pipeline Co., has been appointed to the Louisiana Commerce and Industry Board.

ROBERT P. STACY, administrative vice president of the Connecticut Light & Power Co., Berlin, Conn., is the newly elected president of the Connecticut Chamber of Commerce.

FRANK C. SMITH, board chairman of Houston (Texas) Natural Gas Corp., has been elected chairman of the board of trustees of the Institute of Gas Technology for 1956.

Deaths

EDWARD E. DUVALL, 76, for 40 years secretary of the Consolidated Natural Gas Co., New York, died recently in Great Barrington, Mass. He retired in 1951.

JOSEPH J. CURVIN, 53, purchasing agent for United Gas Corp. Shreveport, died recently following a month's illness. Mr. Curvin joined United Gas in 1936 and had been purchasing agent since 1950.

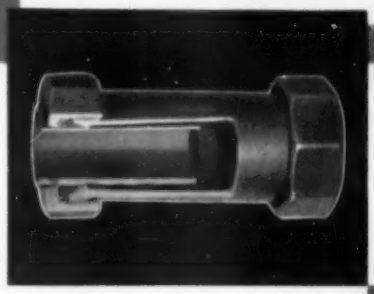
BERNARD S. RODEY JR., an officer of Consolidated Edison Co. of New York and manager of the company's tax department since 1946, died recently. He was 62.

HARRY A. SAUTTER, 69, superintendent of distribution of the Bridgeport (Conn.) Gas Co. for 48 years, died of a heart attack recently.

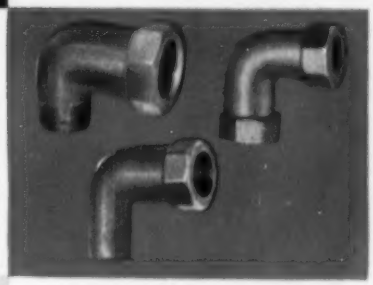
NORMAC

Couplings, Sleeves and Fittings for ☆ UNIFORMITY ☆ DEPENDABILITY ☆ ADAPTABILITY

Normac gas distribution products are engineered and manufactured to meet every requirement of modern gas distribution. Write today for catalog.

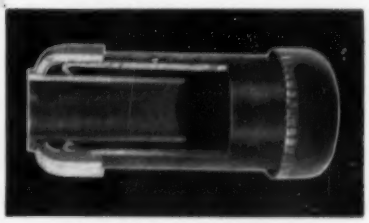


NORMAC COUPLINGS
Normac malleable couplings and sleeves offer the ultimate in deflection and strength with a center wall thickness greater than the wall thickness of the service pipe on which they are used. Every Normac fitting is individually air tested.



COMPRESSION-END "ELLS"
Normac ells of all types incorporate every feature of the Normac coupling plus full coupling depth.

COMPRESSION-END SERVICE "TEE"
Full coupling depth. Special threads on male end prevent dropping into old hand taps.



NORMAC #60-A STEEL COUPLINGS
Manufactured from extra heavy wall pipe. Couplings are available with either seamless or welded centers in sizes from ¾" to 1½" inclusive. 10" and special length centers available.

Normac also manufactures a complete line of red brass fittings in O.D. sizes: ⅝", ⅞", 1⅛", 1⅜"—and a complete line of insulated couplings and fittings.

NORTON-McMURRAY MFG. CO.
122 South Michigan Avenue — Chicago 3, Illinois

Couplings · Meter Bars · Sleeves · Cocks · Bell Joint Clamps · Service Tees & Ells

Regulatory trends
Continued from page 12

may have been 50% or 100% more than book depreciation or allowable rate case depreciation.

6. A very practical aspect of this matter is the expense of the detailed engineering and accounting work required to normalize present income taxes and then be prepared to prove the equitable normalization of future income taxes in future rate proceedings. The additional expense of this work would certainly offset somewhat, and could conceivably exceed, the actual benefit of accelerated depreciation. It should be noted that neither respondent nor any other company has submitted to this commission, formally or informally, a method or plan of procedure designed to assure equitable normalization of income taxes in future years for the ultimate protection of utility customers.

7. Reports of the U. S. House and Senate Committees disclose the principal intent of accelerated depreciation to be, (a) eliminate controversy between the taxpayer and Internal Revenue Service regarding 'reasonable' allowances for depreciation, (b) encourage plant investment particularly in 'risky commitments in fixed assets', (c) stimulate the country's economy by aiding small business and farmers particularly, 'who are especially dependent on their current earnings or short-term loans to obtain funds for expansion', and (d) allow faster tax depreciation in earlier years of property life 'more in accord with the actual pattern of loss of economic usefulness.' Congress allowed liberalized depreciation to all business enterprises but obviously its principal purposes are not particularly applicable to regulated public utilities whose price of product is 'cost of service.'

"Considering this issue in the light of the foregoing comments and conclusions, we hold that accelerated tax depreciation does in fact permit utilities to reduce income taxes and reduce their actual cost of service over an indefinite but extended period of years. We hold also that accelerated tax depreciation no more justifies normalizing allowable taxes than do some past tax depreciation practices of many utilities, or than do other provisions of the income tax law which have always permitted radical differences between tax deductibles of any utility and established utility or industrial accounting practices. We, therefore, reject respondent's claim and will allow income taxes based on actual taxes paid."

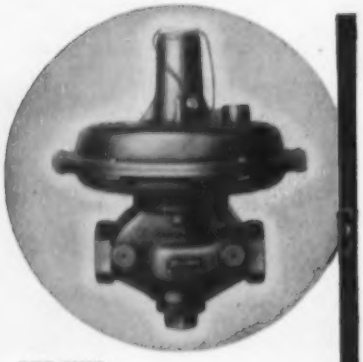
Indiana sees a provision for interest-free funds

The Indiana Public Service Commission has released the latest decision on this subject. It allowed a substantial rate increase to a utility, and commented upon liberalized tax depreciation and rate-making as follows: "By testimony of the public's witness, the question of whether deferred federal income tax should operate as a charge against net operating income was posed. In the final determination of present net earnings this is a substantial item, amounting to $2,609,000, and the decision in this matter, when equated to gross dollars of revenue, would amount to nearly $6 million in the rates. The accounting procedure used in connection with these items in recording tax deferrals is a subject of the commission orders in Cause Nos. 25311 and 25842 (1954) 7 PUR 26, 31. These orders state specifically in their ordering paragraphs that 'said accounting procedures shall not be, and shall not be deemed to be, controlling of said accounting procedures for rate-making purposes, . . .'

"In the original proceedings in this matter before the commission the item

Steady

REYNOLDS LOW PRESSURE REGULATORS



PIPE SIZES:
¼" to 8"
¼" to 3" with screw connections
3" to 8" with flange connections

Reynolds Low Pressure Regulators guarantee steady, constant, unvarying outlet pressure even though the volume varies and inlet pressure fluctuates. Precision built and delicately balanced for accurate performance on low pressure installations, the units illustrated are backed by factory tests over a wide range of operating conditions. Reynolds Low Pressure Regulators are economical and safe. Our Engineering Department is at your service.

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Dallas, Texas

Eastern Appliance Company
281 Vassar Street
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Waldo S. Hull
258 Lee Circle
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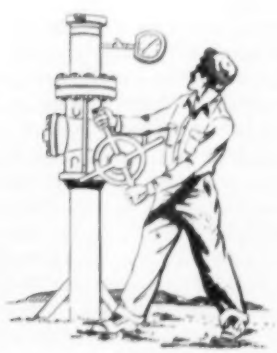
GAS CONTROL SINCE 1892

of $2,609,000 was allowed as a charge against net operating income, and will be so allowed in the consideration of net operating income in respect to new evidence. The commission is not, however, unmindful that such accumulations provide large amounts of interest-free capital and in some way, depending on the magnitude of such charges, tend to satisfy requirements for new capital and, in an over-all consideration of capital costs, have the general effect of reducing that capital cost. We are not of the opinion, however, in this cause that we should take the position that such charges to net operating income should be disallowed, for this would tend to set aside the stated desire of the Congress of the United States when it provided for such tax relief. The commission understands it was the intent of the Congress to stimulate the expansion of the nation's industry by providing such interest-free funds, thereby taking some of the pressure for capital off of national markets. We think it is equally discordant, however, with simple economics to refer to such items as future liabilities, as the petitioner has done frequently in this cause. In the orders relating to the accounting of such matters hereinbefore referred to, we have restricted the use of such funds only to the extent that they may not be paid out in dividends to the common stockholders of the company. The funds generated by such deferrals are available for every other purpose, including the payment of excessive maintenance charges, the construction of plant, on which the utility could then seek to earn, as it does in this cause, higher rates, and for the payment of capital costs other than equity costs."

Accelerated tax depreciation will become a major factor in all future rate cases when the utility has accounted for income taxes on the new liberalized depreciation basis. ■



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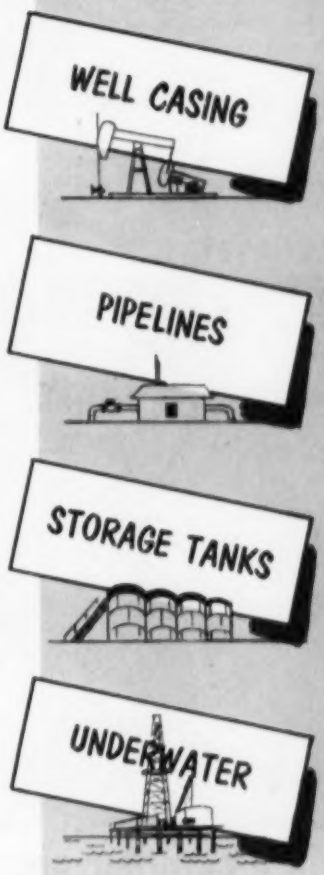

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Washington Report

Continued from page 15

systems have come in the last 60 days or so.

The fund is not particularly popular in business circles, particularly to the sellers of liquid fuels. Cries of "foul" are beginning to rise as the at-first-little-noticed fund begins to become more popular.

Opponents of the measure, belatedly, claim that it is a first step toward the "socialization" of the gas industry, under which governments will be competing with private gas distributors much the way they now compete in the electric power field. The program is actually a government subsidy to permit municipalities to get into the gas business, because government loans have a history of becoming gifts.

Language in the bill permitting loans of up to 100% of the cost of a gas system if there is "an urgent and vital public need" is brushed aside as meaningless by critics of the legislation. A determination of what satisfies this language will be left up to power-happy bureaucrats who are always eager to add to their power and please local politicians.

Practically speaking, it's too late to do much about the disputed fund now, except for the gas industry to counteract its effects by helping formation of privately owned firms in areas considering using these loans where possible.

Delaying tactics begin in Trans-Canada fight

NOW that the blood has been washed off the walls of the Canadian Parliament, proponents of the Tennessee-Midwestern plans are gleeful about the beneficial effects on their pending FPC application to hook onto the Canadian line. Even the principal opponents, somewhat sourly, admit that visions of the maple leafers making pipeline won't go unnoticed when FPC starts working on the case in public again later this summer.

But the opponents—scores of them—don't believe for a minute they're licked yet, although their job may be a little tougher. Talks with their attorneys indicate that they won't be a bit surprised if Trans-Canada winds up in another year or two eating the pipe they'll soon be laying.

Delaying tactics are part of the opposition strategy now. Opponents are threatening to carry the fight to the Supreme Court and the applicants aren't at all happy about the prospect because such delays could put the skids under the Tennessee-Midwestern project.

A spokesman for Panhandle Eastern, one of the three principal opponents of the plan, admits that the prospect of Canadian gas becoming available at the border as a result of Parliament's approval (marked by fist fights and bitter oral battles) of an $80 million loan to help build the 34-in. gas transmission line from Alberta to Winnipeg will help in the Midwestern application before FPC.

A spokesman for the other two principal opponents, Peoples Gas (Chicago) and Northern Natural, admits the approval of the Canadian lines hurts, but he makes these points:

The firms building the Trans-Canada line, most of them American, will have almost $9 million to raise (toward financing the section of the line that crosses the Canadian shield) in addition to the $80 million loan from the Canadian government, and private lenders are going to be wary of pro-

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viding financing until the FPC acts, because many feel the pipeline is so much rusty pipe without U. S. markets.

At the same time, the deadline for starting construction is next spring—unless again extended—and by the time FPC gets through the pending motions to dismiss, and then starts in rebuttal arguments and all the other legal fiddling (which has so far produced 6000 pages of testimony in 43 volumes), that deadline may well be passed. If it's not, or if it's extended, and FPC grants the certificate, then the opponents simply start appealing in the courts. Such delays, according to his reasoning, could materially delay Trans-Canada construction by preventing financing.

The spokesman also dismisses as improbable the possibility that FPC will grant a partial certificate for the northern part of the line (the fight, he claims, is not against Canadian gas but against "raiding" of the opponents markets) because this would mean that the line's customers would be almost entirely dependent upon Canadian gas, and FPC in the Pacific Northwest case a few years ago flatly refused to permit customers to be dependent solely upon imported gas.

One thing's certain, when or if Canadian natural gas begins flowing across the Minnesota border to customers in this country, it's going to have a pinkish tinge from the blood spilled in this fight.

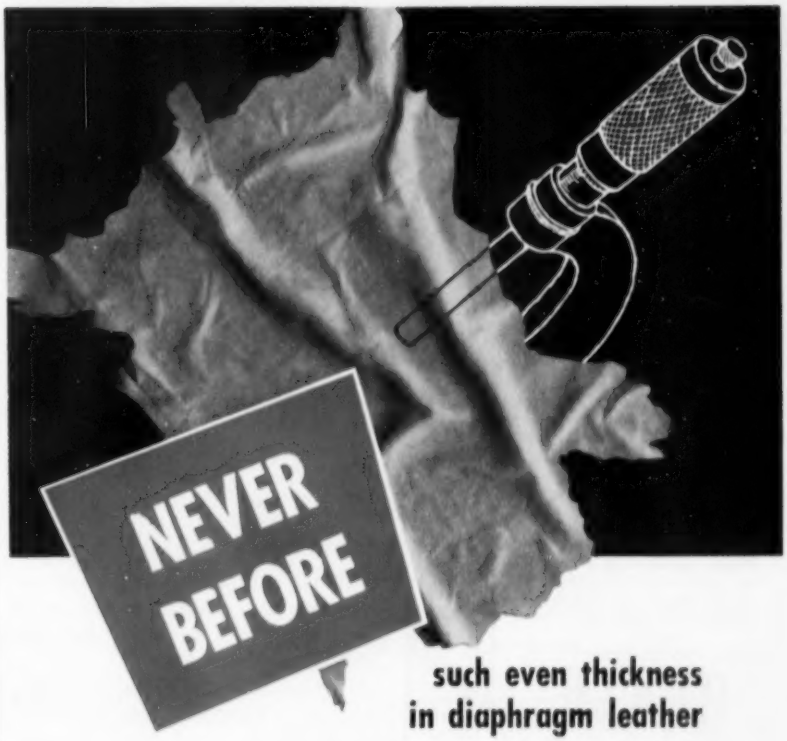
Anticipate setbacks in use of fair field price

PIPELINES, turning toward production of their own gas to protect their sources of supply, may be in for a sharp setback in their attempts to use fair field prices.

Refusal of the Justice Department to appeal—for the Federal Power Commission—a circuit court decision that the commission cannot use fair field prices setting rates on the natural gas Panhandle Eastern produces from its own properties, apparently indicates that the legal eagles at the department believe the case is too weak to press.

Both the FPC and Panhandle have applied to the U. S. Supreme Court for a review of the decision, in which the circuit court upheld a petition by the City of Detroit and ruled that the FPC must use costs, at least as a point of departure, before adopting field prices or any other ratemaking method.

In effect, the Justice Department after studying the case broke all stand-



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ing precedents as the official legal representative of government agencies and told the FPC that if it wanted the decision reviewed, it would have to fight its own battle. The department did, however, magnanimously permit FPC to file the appeal.

If the high court agrees to take a look at the circuit court decision, the battle between FPC and Panhandle and the City of Detroit will probably not get to the oral argument stage until late fall.

FPC is asking the court not only to review the circuit court decision, but to extend the hearing to consider the question of the validity of the use of field price. This is the real meat of the FPC petition, because a normal simple review of the lower court decision would only cover the legal procedures on which it was reached, and not the basic question of the use of fair field prices in setting rates for pipeline-produced gas.

FPC argues in its appeal that under the net-investment rate-base method, the production operations of Panhandle —and thus most other pipeline-producers—would give to its own produced gas less than nothing at the well-

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head compared with the prices for profit paid for the gas Panhandle buys from others.

FPC also argues that flexibility and freedom to select a formula which will best serve the public are "the essence" of ratemaking, and that the cost factor does not meet these tests.

But there is every indication that FPC and Panhandle are going to have to fight a tough uphill battle to lick the cost decision of the circuit court. A loss will put the FPC, its attorneys say, in an almost impossible position, and will throw a serious and costly roadblock into efforts of pipelines to develop their own sources of supply to offset the growing reluctance of many natural gas producers to sell to pipelines and thus come under FPC regulation.

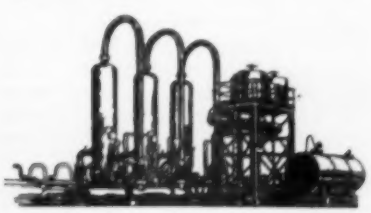
IRS clears up tax troubles

A RECENT decision by government tax moguls should bring a ray of sunshine, dim though it be, into the lives of many gas producers.

In an unpublished ruling, the Internal Revenue Service's tax experts decided that a firm which buys producing gas properties on a contingent-fee type of contract do not have to capitalize expenses on the portion of their production they turn over as payments on the property.

In the case in point, IRS will permit Atlantic Refining Co. to deduct from its taxes the expenses it incurs in producing gas which it turns over to Houston Oil Co. to pay for properties Atlantic bought from Houston. According to an IRS spokesman, Atlantic paid $75 million in cash, and will pay another $125 million by giving Houston Oil 85% of its production. It will take Atlantic about 10 years to complete payment.

An adverse ruling from IRS would have made the deal much less attractive and may have blocked it all together. Atlantic figures the 15% of production it retains will about equal all its production costs, so a ruling prohibiting a tax deduction for the costs of 85% would have hurt. ■



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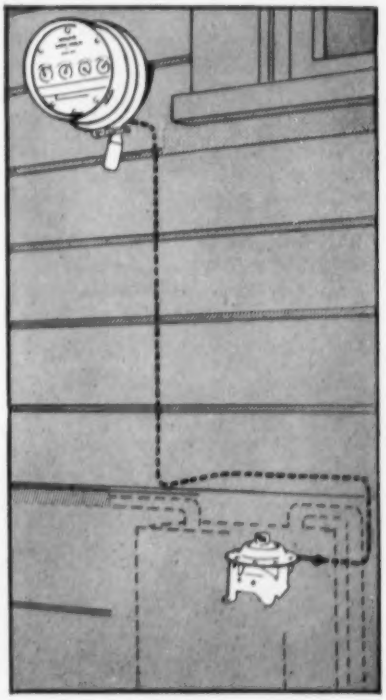

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GAS associations——

Plans, problems discussed at production meeting

Plans and problems of gas utility operations highlighted the 1956 AGA chemical, engineering and manufactured gas production conference held recently in Philadelphia.

Samuel Cohn, Peoples Gas Light and Coke Co., Chicago, as chairman of the chemical and engineering committee, delivered the welcoming address to the more than 450 delegates of the meeting. He introduced J. H. Collins Sr., New Orleans (La.) Public Service Inc., who is chairman of the operating section.

Mr. Collins gave a brief review of the section's projects, surveys and investigations. In addition, Mr. Collins presented service awards to S. W. Horsfield, Long Island Lighting Co., chairman of the AGA manufactured gas committee for 1955, and to I. B. Dick, Consolidated Edison Co. of New York, chairman of the AGA chemical and engineering committee for 1955. The presentation of plaques to the ex-chairman inaugurated a program of citing committee leaders for their service.

The keynote address of the conference was delivered by William B. Tippy, Commonwealth Service Inc. He told the conferees that "now is the time for an aggressive reappraisal of the whole picture if the industry is to realize its full potential as supplier of energy to the consuming public."

Mr. Tippy dealt at length on the need for research and the swift development of the industry's technical operations and methods. He said research is going forward in the industry principally toward the development of a synthetic natural gas.

"Research being a time-consuming process," he said, "we should drive through to conclusions to provide assurance to ourselves, the financial world, and our customers that gas in here to stay and that our dynamic industry is not in fact tied to one limited natural resource."

Following up Mr. Tippy's remarks, T. L. Robey, coordinator of research, AGA, told the conference that results of gas operations research have been encouraging. In addition, Mr. Robey gave a word picture of AGA research in the domestic field, industrial and commercial uses, pipeline research and gas air-conditioning research.

Samuel McKay Jr., Bell Telephone Co. of Pennsylvania, spoke to the conference on the subject of "Trend of Accidents in the Gas Utility Industry." He said that although the gas industry has successfully lowered its accident frequency rate for eight consecutive years to its lowest mark in history, there is still a great deal of room for improvement. He urged the nation's gas companies to become more aggressive and active in the development of accident prevention programs.

Dr. Louis C. McCabe, Resources Research, Inc., Washington, D. C., delivered a paper on "Current Developments in Air Pollution Control." He presented a summary of the work being carried on throughout the United States to control air pollution from all sources — the burning of community wastes, automotive exhausts, industrial operations, and others.

B. C. White, Stone & Webster Engineering Corp., chairman of the builders' subcommittee, gave a report of the work of 12 companies engaged in the manufacture of gas production, processing and handling equipment.

Continued on page 102

Yard model (right) sits directly on ground, with no rot or corrosion danger. Can be fastened to stakes. Wall model (above) has slots in flange, slips over screws.

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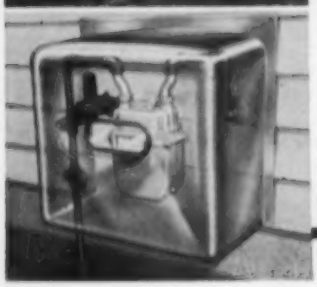

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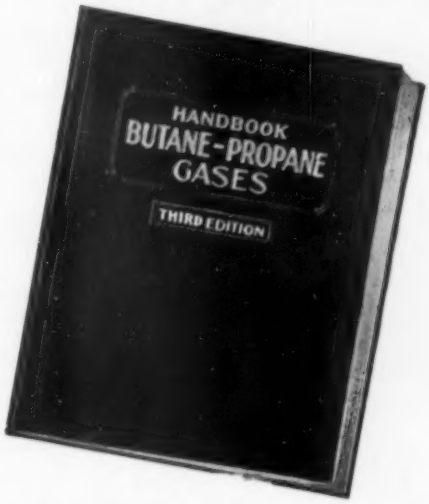

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Fire Protection and Control

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GAS calendar

July

9..SGA Pipeline Right-of-Way Conference and Chief Draftsmen Conference — Statler-Hilton Hotel, Dallas.

23..SGA Transmission & Production Accounting Conference Jack Tar Hotel, Galveston, Texas.

24-27..NARUC Annual Convention — Sheraton Palace Hotel, San Francisco.

27..SGA Pipeline Engineers Conference and Dispatchers Conference — Captain Shreve Hotel, Shreveport, La.

August

27-29..16th Annual Appalachian Gas Measurement Short Course—West Virginia University, Morgantown.

September

7..New Jersey Gas Association Annual Meeting — Spring Lake, N. J.

11..NEGA Safety Conference—Hotel Statler, Boston.

11-13..Pacific Coast Gas Association Annual Meeting—Hotel Del Coronado, Coronado, Calif.

12-14..Mid-West Gas Association Gas School and Conference — Iowa State College, Ames.

12-14..3rd Annual Electrical Conference of the Petroleum Industry (AIEE)—Kansas City, Mo.

14..NEGA Commercial-Heating-Industrial Division—Wachusett Country Club, West Boylston, Mass.

14-15..Maryland Utilities Association Fall Conference—Cavalier Hotel, Virginia Beach, Va.

18-19..AGA Accident Prevention Conference — Shirley-Savoy Hotel, Denver.

19-21..Southeastern Gas Association —Hotel Sir Walter, Raleigh, N. C.

October

15-17..AGA Annual Convention — Atlantic City, N. J.

22-26..National Safety Council — Chicago.

November

12-15..American Petroleum Institute —Conrad Hilton Hotel, Chicago.

1957

February

3-5..27th Annual Mid-Winter Conference, Public Utility Buyers Group, National Association of Purchasing Agents — Brown Hotel, Louisville, Ky.

March

11-15..National Association of Corrosion Engineers—Kiel Auditorium, St. Louis, Mo.

21-22..New England Gas Association Annual Meeting—Hotel Statler, Boston.

25-27..MidWest Gas Association—Hotel Nicollet, Minneapolis.

28-29..Oklahoma Utilities Association Annual Convention — Tulsa.

April

8-10..National Conference of Electric and Gas Utility Accountants—Sheraton-Park Hotel, Washington, D. C.

8-11..GAMA Annual Meeting — The Greenbrier, White Sulphur Springs, W. Va.

8-11..AGA Distribution, Motor Vehicles and Corrosion Conference—Rice Hotel, Houston.

16-18..Southwestern Gas Measurement Short Course—College of Engineering, University of Oklahoma, Norman.

16-18..AGA Sales Conference on Industrial and Commercial Gas—Jung Hotel, New Orleans.

29-May 1..Southern Gas Association Annual Convention — New Orleans.

May

6-7..AGA Residential Gas Section Eastern Sales Conference — Hotel William Penn, Pittsburgh.

9-10..AGA Gas Supply, Transmission and Storage Conference—Mark-Hopkins Hotel, San Francisco.

20-22..AGA Mid-West Regional Gas Sales Conference—Edgewater Beach Hotel, Chicago.

20-22..AGA Chemical, Engineering and Manufactured Gas Production Conference — Balmoral Hotel, Miami Beach, Fla.

June

23-27..Canadian Gas Association—Jasper Park Lodge, Jasper, Alberta, Canada.

24-25..Michigan Gas Association—Grand Hotel, Mackinac Island, Mich.

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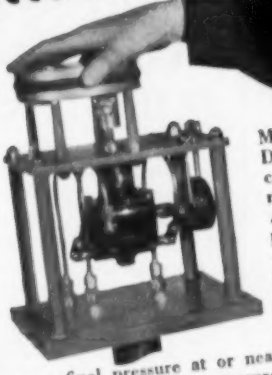

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associations • *Continued*

Gorman heads SoCal water heater group

S. C. Gorman

The Southern California Water Heater Manufacturers Association has announced the appointment of Stanley C. Gorman as executive director of the association.

Mr. Gorman has served as director of the water heater division, Gas Appliance Manufacturers Association, and as field representative of the American Gas Association. He began his gas career with Southern California Gas Co. in 1935.

In his position with GAMA, Mr. Gorman developed and directed the Court of Flame campaign which emphasized the need for properly sized, top-quality domestic gas water heaters.

Mr. Gorman's headquarters will be in Los Angeles.

ASSOCIATION NOTES

M. H. Parkinson, executive vice president of United Gas Improvement Co., Philadelphia, has been elected president of the Pennsylvania Gas Association.

L. G. Wiseley, superintendent of purchases and supplies, Michigan Consolidated Gas Co., Detroit, is the newly elected chairman of the Public Utility Buyers Group, National Association of Purchasing Agents. Other officers are Harold T. Belcher, Consumers Power Co.; 1st vice chairman; R. H. Sperreng, Union Electric Co., vice chairman; J. J. Morse, New Orlean Public Service, vice chairman; and J. B. Homsher, Gilbert Associates Inc., secretary-treasurer.

The AGA is offering copies of the 1953 edition of the Gas Appliance Service Water Heater Manual at reduced prices. Copies of the 248-page service manual can be obtained from AGA headquarters, 420 Lexington Ave., New York at $1.50 for single copies, $1.25 each for 10 to 99 copies, and $1 each for 100 copies or more.

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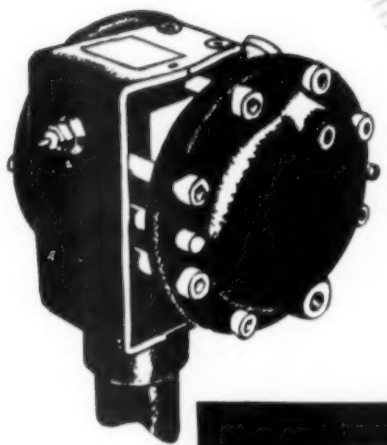

Bellows-type orfice meters tested for gas measurement

See page 105

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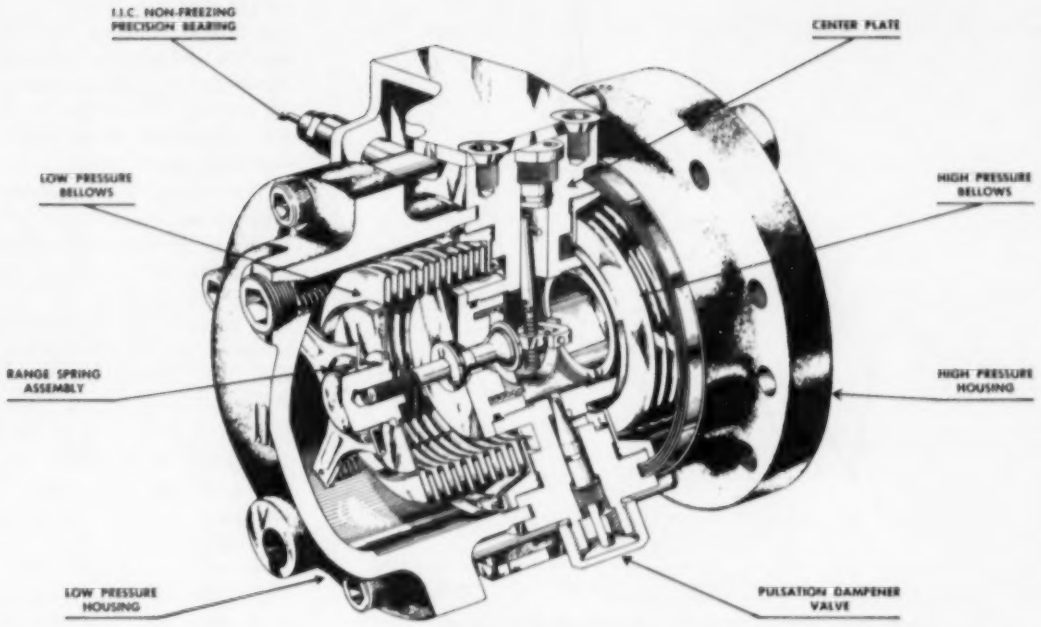

Cutaway drawing of the bellows-type orifice meter.

Bellows-type orifice meter tested for gas measurement

Colorado Interstate Gas Co. has just completed a series of exhaustive tests on the use of a bellows-type orifice meter for gas measurement. They feel that the meter will be a great help if it lives up to expectations in measurement of hard-to-handle liquids and gas.

By KEN KRIDNER, Assistant Superintendent, Gas Measurement
Colorado Interstate Gas Co., Colorado Springs, Colo.

TODAY'S measurement personnel and project engineers having the task of selecting the proper equipment for the proper job have been given the opportunity of reviewing an additional measurement tool—the bellows or dry-flow type of orifice meter.

Although relatively slow in making its appearance on the horizon of measurement work, the bellows meter is rapidly taking its place in the field. For many years, the mercury-type orifice meter was virtually unopposed and thus has become widely accepted and enjoys a predominance of use for measurement or control where differential pressure across a restriction placed in a flow line is desired.

In view of the wide usage of the mercury-type orifice meters, we do not believe discussion of their operation or construction would serve a worthwhile purpose in this article. Suffice it to say that the differential pressure across a restriction placed in a flow line is applied to either side of a mercury column enclosed in a high pressure housing. The vertical difference existing between the heights of the mercury column is converted to an angular difference, by use of floats and bearings, and the difference so obtained recorded or transmitted as desired. Use of mercury as a medium to determine the pressure differential has been based on its weight and stability; however, several disadvantages have been apparent, especially in the measurement of toxic or corrosive gases and liquids. Contamination of the mercury, accumulation of foreign matter in the differential housing, leak-

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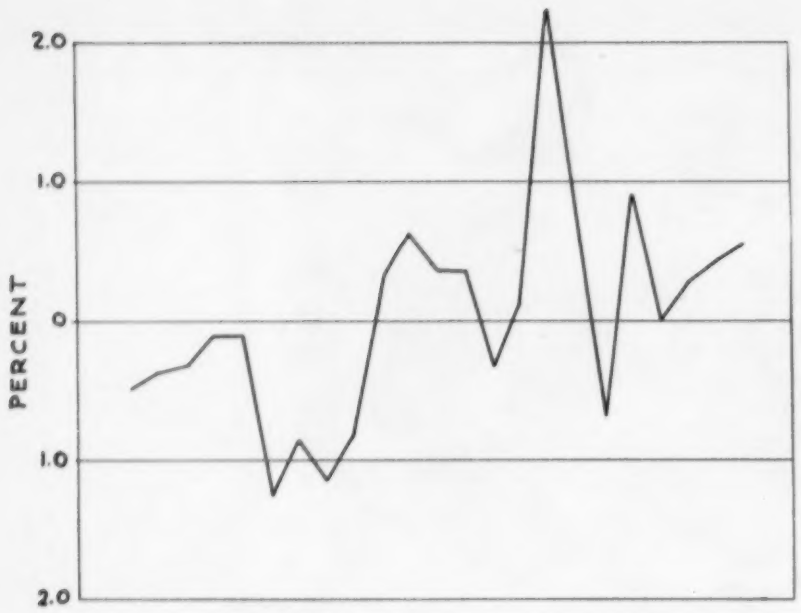


Fig. 1. Graph shows results of test between bellows-type and mercury meters at a sales measurement point. The sales meter registered 128,502 Mcf, the check meter 128,486 Mcf, a difference of 16 Mcf.

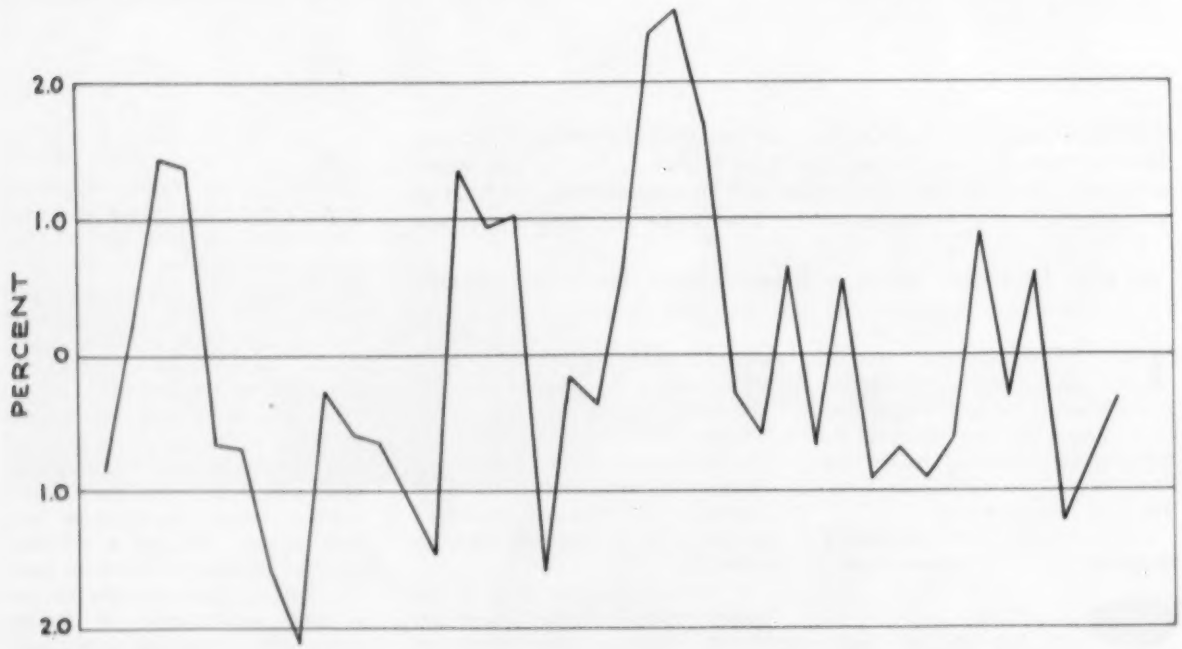
age of corrosive compounds through the pressure bearing into the meter case and subsequent deterioration of the chart drive clock mechanism or loss of mercury, to mention a few, can cause trouble for the personnel servicing the meter.

The advent of the bellows meter does not necessarily represent the solution to problems experienced with mercury meters, but does provide the person evaluating the job to be done with an additional tool that might be better adapted to a particular application. To possibly enable improved evaluation of the meters available, our experience in the use of the bellows meters will be discussed.

The bellows meter obtains its nomenclature from the use of expansionable bellows used to replace the mercury medium of the mercury-type meter. The bellows are normally made of an alloy of steel impervious to the action of most toxic and corrosive compounds. The bellows, which are attached to a center plate of the meter, are evacuated and then filled with a liquid having a low freezing point to preclude possibility of malfunctioning of the instrument during extreme cold weather. The common procedure has been to fill the bellows with a mixture of glycol and water.

The meters used by our company (in the program to evaluate the action of bellows meters) incorporated a shaft

Fig. 2. This is the result of another check made at sales point. The sales meter showed 71,886 Mcf, the check meter 71,843 Mcf, a difference of 43 Mcf.



affixed to the low-pressure bellows and allowed to float in one instrument while attached to both high and low bellows in the second instrument. The liquid must pass through an orifice and a pulsation dampener to move from the bellows located in the high-pressure housing to the bellows in the low-pressure housing. In turn, the horizontal movement of the shaft is transmitted to the meter case and converted to angular motion for recording, or other use as desired, by use of a shaft enclosed to preclude loss of the liquid from the bellows unit. The differential range of the meter is controlled by use of range springs mounted over the bellows unit in the low-pressure housing which maintain a tension on the bellows. These springs may be removed and replaced to convert the instrument to a different range by removing the low-pressure housing case.

Since the bellows unit is filled with liquid which is not compressible, any pressure in the high-pressure housing exceeding that applied to the low-pressure housing will cause the bellows in the high side to compress, forcing the liquid within the bellows to move through the pulsation dampener, the over-range valves and into the bellows in the low-pressure housing. The resulting shift of the low-pressure bellows will cause movement of the horizontal shaft and, in turn, the angular rotation of the bearing transmitting the motion to the meter case. An indication of the pressure unbalance across the restriction will be apparent on the meter chart. Should the pressure difference between the two bellows units exceed the limits of the differential range springs used, the valve seats mounted on the shaft will seat into the over-range valves and effectively isolate the two units precluding further displacement of liquid between the bellows units and further movement of the shaft. When the over-range condition ceases, the valve opens, permitting the meter to return to its normal functioning.

The bellows meters are equipped with temperature compensators to maintain at a minimum erratic measurement resulting from temperature fluctuations. This is accomplished by an additional chamber attached to the low-pressure bellows on one meter and by use of a bimetallic metal strip on another. The desired result of the compensating medium is the same in both cases and is intended to permit reduction or cancellation of differential temperature variations.

Fig. 3. This is the result of a test conducted at a purchase measurement point. The purchase meter registered 273,044 Mcf, the check meter 272,192 Mcf, a difference of 852 Mcf.

All component parts of the meter exposed to the gas or liquid being measured are manufactured of a material impervious to the action of corrosive compounds. The further enclosure and consequent isolation of the pressure bearing precludes possibility of the corrosive gas or liquid leaking through the bearing into the meter case. The use of a clean, non-corrosive liquid medium to fill the bellows unit is intended to permit trouble-free operation of the working parts enclosed. The passage of the liquid through the pulsation dampener in its travel from one bellows to the other should permit improved control over pulsation or frequency action on the differential. Calibration of the differential unit on the bellows meter is controlled by adjustment of micrometer screws mounted on the differential arm located inside the meter case. Thus there is no necessity to remove the high- or low-pressure housing in making adjustments. The calibration linkage for the static arm is similar to those used in the mercury type meter. The high- and low-pressure housing on the bellows meter are tapped with 0.50-in. and 0.25-in. pipe thread holes and the housing may be rotated as desired to permit the gas to enter the housing by use of the most expedient size tubing. If considerable liquids are being encountered the 0.50-in. taps would be rotated to the bottom and connections made to permit the liquid to drain back into the flow line. Should a slug of liquid be apparent instantaneously at the orifice and be transmitted into the meter tubing, erratic or inaccurate measurement would result only until the liquid passed the restriction and taps, at which time the liquid in the lines and housing would gravity feed into the flow line.

Application

The introduction of bellows meters in our operations resulted from efforts to effectively combat the corrosive action of hydrogen sulfide on our measuring equipment. Existence of this compound at our measuring installation in the field necessitated the checking of the meters at intervals of not more than one month and in most instances at a higher frequency. The degree of clock replacements, mercury loss and meter deterioration was unjustifiably high at those settings where we encountered hydrogen sulfide.

The availability of an instrument constructed of a material not affected by the corrosive gas was a welcomed possible solution to the problem. Subsequent to the installation of the bellows meter, meter personnel have found no deterrent action on the bellows or interior of the unit, no clocks have been replaced for failure of parts resulting from action of hydrogen sulfide and the meters have been returned to a routine checking schedule. A close check of the

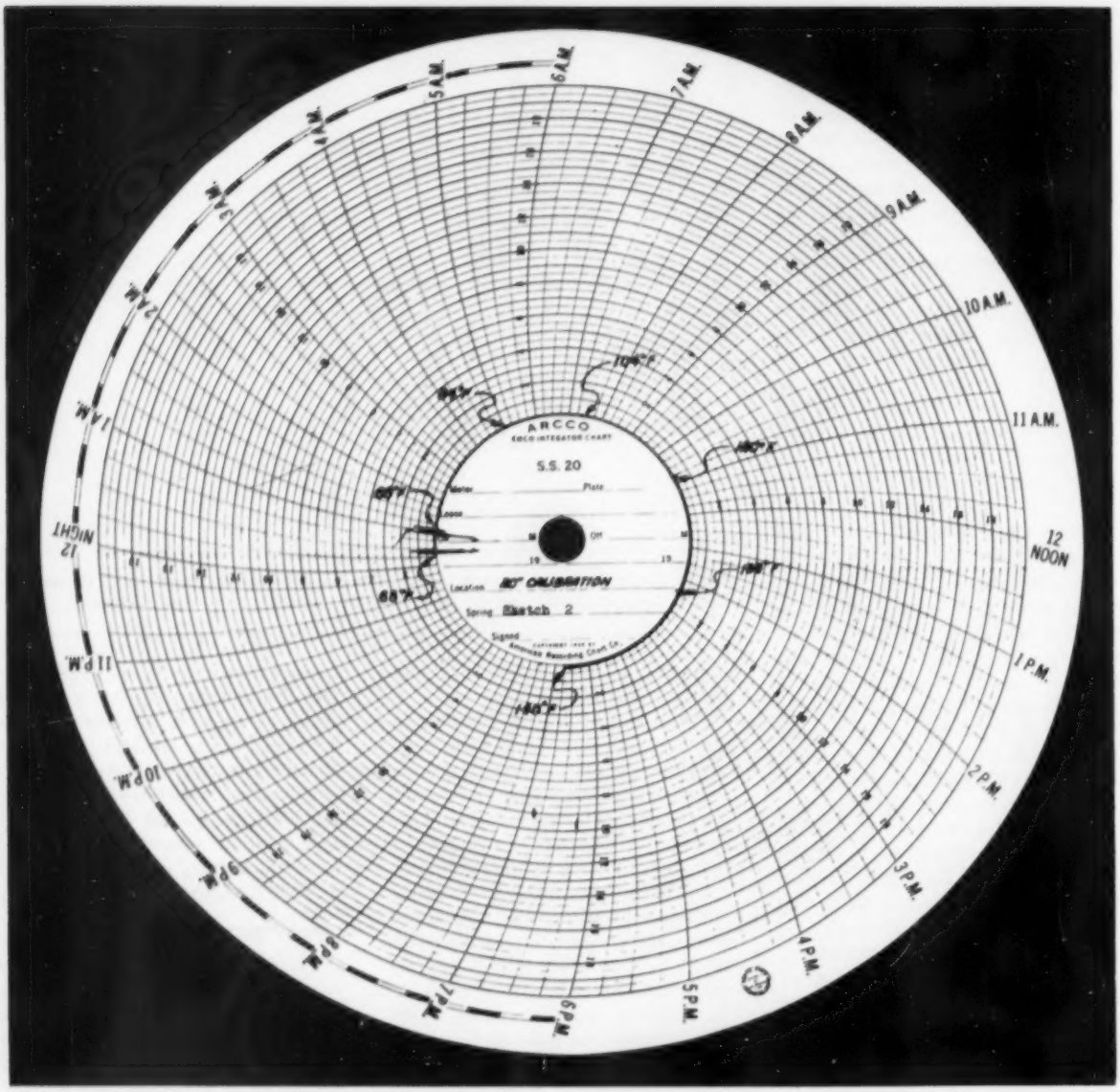


Fig. 4. This chart shows the result of a test with a bellows-type orifice meter when using a 20-in. range spring at various temperatures.

operation and possible deterioration of the meter was observed until we were satisfied as to its performance.

Results obtained from field use of the bellows meter in an isolated application led to an extensive program to permit evaluation of measured volumes when using the bellows and mercury-type meters. In such study we were not interested in ascertaining superiority of either type meter over the other but instead in the relative closeness of calculated volumes that might be expected. To accomplish this end result, a bellows and mercury-type orifice meter were connected across the same restriction and adequate gauge lines used to permit obtaining the pressure at the meter housing. The answers found are graphically shown in *Figs. 1, 2* and *3*. Rather than isolate the test to field conditions we conducted identical type tests under normal conditions for measurement at a sales point, purchase point and for widely fluctuating temperature conditions. The results obtained revealed conclusively that volumes computed from one of either mercury or bellows-type orifice meters may be checked against the other type of meter with no appreciable deviation to be expected.

We were also interested in drifting of the differential pen from atmospheric temperature variations. This is normally encountered in the heat of the day and causes a noticeable drifting of the differential pen from its true zero position. *Figs. 4* and *5* reflect the results of tests when using a 20-in. and 100-in. range spring at various temperatures.

The use of bellows meters in the field of measurement might well depend upon the ability of the manufacturers to make available to the operator a procedure for refilling the bellow unit. Obviously, loss of any liquid from the bel-

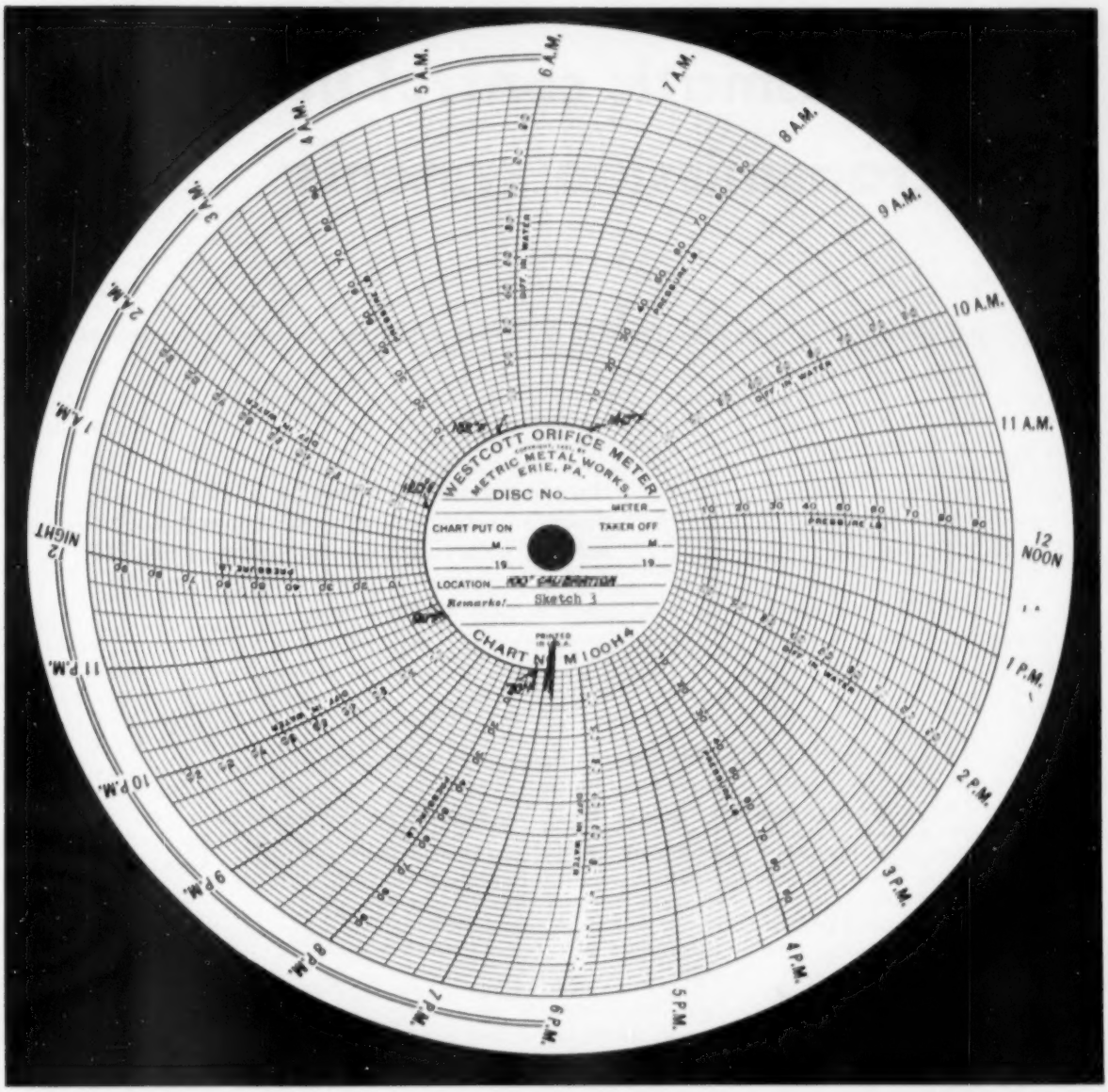


Fig. 5. This is the chart produced in a test of a bellows-type orifice meter using a 100-in. range spring at various temperatures.

lows unit would permit a gas to replace the non-compressible fluid that was lost. There would be an evident error from liquid displacement from one bellows to the other. This error should be detected at the time a differential test is conducted. It would be a material disadvantage to the operator if refilling of the bellows should require return of the unit to the manufacturer.

The size and weight of the bellows unit (without the housing cover) are a decided asset in the maintenance of the meter. In case of a malfunctioning meter, the bellows unit may be removed and replaced, the errant unit taken to a shop and replaced. This should enable the personnel maintaining and testing the meters to eliminate repair of units in the field by replacing bad units found and repairing the units at the shop.

The bellows type meter has shown an excellent ability to reflect instantaneous response. Tests conducted on meters in our fields have shown complete movement from extreme to minimum differential limits in one second.

Conclusion

In conclusion, it appears that whereas the bellows-type meter has been on the measurement scene a relatively short period of time, its applications to specific operations may well lead personnel to further evaluation of the equipment available. The operation to be performed by measurement personnel and by use of measurement equipment should be relatively lightened if the bellows meter as a tool is capable of meeting expectations and permit handling of liquids and gases that heretofore have been difficult to measure. The relative higher cost of the bellows meter at this time precludes to a degree its active competition with the mercury meter for the conventional measurement job, but future developments should result in improved equipment on a competitive basis on both the mercury and bellows fields. ■

Automatic control in gas transmission systems

Here is a critical evaluation of the gas industry's present day system of controls. The authors believe that automation in the industry is a must if gas is to retain its competitive position as a fuel.

By H. E. PINKERTON, Manager, Engineering Applications
and
J. G. STEPHENSON, Section Head, Applied Electronics Department
Airborne Instruments Laboratory Inc., Mineola, N. Y.

THE dynamically vital gas industry, representing millions of investor dollars, is currently facing a formidable host of potential competitors—facing them with a system of control that is so bound in waste labor costs and system inefficiencies that there is only slight hope that it can compete in the future without serious degradation of comparative earning standards or curtailment of service.

Solar energy, nuclear energy, and liquefied methane are no longer just terms in the economic wish book, they are physical realities that are receiving high pressure treatment such as can only yield results. The performance results are already on the record; the cost results have not yet been resolved but the forecasts for the immediate future indicate that your customers shall soon be enjoying reduced costs for delivered heat and power—either at your expense or to your benefit.

I can well imagine that many of you have already mentally dropped my opening remarks into the collective lap of your company administrators, in blind confidence that these able gentlemen will pull a rabbit out of the hat to save the situation. Well, you can take it from me that more businesses in this country have probably passed on because of this "blind confidence" philosophy than for any other single reason! No, let's face it: if the gas industry deteriorates in the face of the next few years' competition, the communications people will be as largely to blame as their administrators. The economic and efficiency improvements required to compete can only come through improved system control. In long-line gas transmission as well as local gas distribution the control barrier lies entirely in communications.

GAS

This article, first of a two-part series, is based on remarks made by Messrs Pinkerton and Stephenson at the American Gas Association gas supply, transmission and storage conference May 10-11 in Chicago. This month the authors discuss the responsibility of communications in the automation of gas pipelines. In Part II, which will appear in the August 1956 issue of GAS, they will present the methods of implementing the automation of gas pipelines.

Only barrier

Let me restate that point, *in your industry, the only barrier to control improvement is communications.* Every

gas control parameter that is presently transcribed by a man for evaluation by another man and reaction by yet another man can be read, evaluated, and acted upon by standard or special versions of existing transponders or transducers. Every control calculation or comparison that is presently made by a man from the aforesaid parameters collected by the first man, can more accurately and rapidly be accomplished through application of known automatic computer techniques directly from the transducer or transponder signals without any intervention from a man. Every corrective control function performed by a man in response to the aforesaid computations or comparisons can be performed more accurately and more rapidly by known control machine techniques. And all transmission, reception and monitoring of transducer outputs, computer calculations and control element responses can more economically, more rapidly and more dependably be handled by known automatic communications systems than by currently employed manual systems.

Yes, all of the elements for economic improvement in gas pipeline control are contained in known technological developments presently employed in other facets of American enterprise and readily available to the gas industry. In fact, most of the elements are represented in the heterogeneous control experiments that are to be found sprinkled throughout the gas industry at the present time—only the *system* aspect seems to have been neglected.

Interim attempts

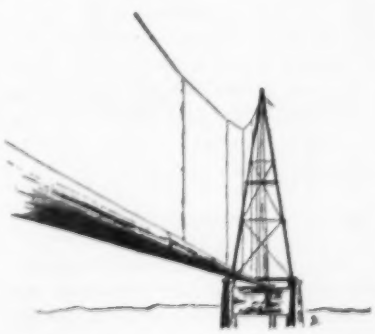
Portions of communications budgets are continually being expended on interim attempts to arrange excellent accessory components into sub-system control demonstrations in the hope of rekindling the spark of control communications progress in management's eyes—a spark that has long since been dulled by sales and operational problems. However, these sub-system demonstration installations have apparently served only one purpose—that of masking the true efficiency of an adequate control system by introducing confusion and distrust in the minds of the men who must make gas industry progress decisions.

You cannot expect your administrators to look with understanding upon spot trials, regardless of the excellence of the components involved. Your management people are not communications people in most instances, nor are they blessed with your crystal ball of communications experience with which to mentally expand a spot installation into a system concept. On the other hand, you cannot expect them to be particularly enraptured by an elaborate communications and control proposal on paper, if it is devoid of economic promise. The day of romance was passed in each of your companies when the first throughput quota was met. From that day on, the predominant questions in the minds of your investors and your management have concerned constantly improving service and an improved price competitive position that would promise a reasonable investment return and a sound future.

Automatic control... Tieing in of systems can open a new era for the gas industry

Continuous effort

Too often, the paid communications expert has not done his part in keeping his administrators aboard the technological bandwagon. He has failed to continually re-evaluate for his firm the status of automatic control systems based on communication advances. He has played ostrich, burying his head in legitimate excuses while exposing his fear of, or reluctance to, change. I hate to say it but except for a few courageous examples such as Tom Humphrey's Alabama Gas installation, the pattern for the industry appears to be uniformly dismal; spot test installations here and there, new lines being laid with little or no consideration given to automatic system control advantages, and the consumer price on the transmitted product constantly increasing! The situation isn't just dismal, it is—as a Texan friend of mine would say—"plumb disgustin'!"



Let's take a look at these excuses that I just took the liberty of calling legitimate. For the first and most flagrantly abused excuse category, we can employ the generic title *undependability*. This category has, for some people, become a fixation that defies penetration. This fixation so absorbs the mind of its victim that he reads about electronic amplifiers being laid on the ocean floor as part of the trans-Atlantic cable and either tells himself that what he's reading is a commercial propaganda exaggeration or else he cringes at the thought of the maintenance effort required in case of trouble 20 or 30 years hence. He completely ignores the statistical history, scientific integrity, and hard money that is going down into the ocean with each of those amplifiers. He may even sit back and salve his conscience with the thought that failure in the cable only results in people who talk too much talking less, whereas failure in a gas pipeline system may mean the side of a mountain blown off or a shivering bunch of consumer customers. Undoubtedly his fixation allows such thoughts to salve his conscience by blanking out his knowledge of the fact that the 70 people in the airplane over his head are almost completely at the mercy of those components that he casually brands undependable—components that were put into the airplane to compensate for the frailties and inconsistencies of human pilots. He has forgotten that his safety from enemy attack is under control of automatic equipment that locates, tracks, and intercepts enemy planes without human aid, aiming and launching missiles with computed accuracy beyond the most extreme capabilities of the human system.

Victim of fixation

The victim of the undependability fixation lives behind an information filter which, regardless of what is put in, allows only one output—a statement that automatic system control is undependable and therefore unsafe! He

Automatic control... Portions of budgets are constantly spent on interim systems

must in some way be reached with an understanding of the fact that the counteractive of undependability is procurable—at least in the case of electronic control systems — and is usually referred to as system integrity. He must be made to understand that condemnation of the automatic system concept on the basis of shoddy or inadequate examples is as silly as condemnation of all jewelry because a dime-store ring turned green on his finger.

This brings up the other most commonly heard excuse for avoiding automatic systems concepts—Cost! I've just made a point of the fact that you cannot expect satisfaction from cheap, shoddy, or inadequate merchandise so the boys with a cost fixation are probably sitting back ready to relax on their laurels. I hate to be so unpleasant, but I must insist that the cost excuse in most cases doesn't stand close examination either.

I believe you will find that reputable firms in the control and instrument industry will discourage purchase of any automatic system that cannot promise to pay for itself rather quickly in improved operations and reduced labor cost per product unit. There is just too much business available in the happy customer realm to make it worth-while spending time on a system that is almost sure to develop future unhappiness between the buyer and the seller. However, the chances of a completely integrated control system not paying off in the gas industry are extremely remote when undertaken by those persons in the industry who are blessed with confidence, open minds, and the sole objective of improved service at reduced cost.

There are other lesser excuses for resistance to progress. We are all familiar with them and, since they lean quite heavily on the cost and undependability excuses discussed, I'd like to skip them at this time and get back to my purpose —constructive suggestion.

Optimum system

You will readily recognize the sneaky tactics involved in putting you on the defensive first and then belittling objections before you have had a chance to voice them. Yes, I have been paving the way to open minded consideration of the component parts that make up an optimum system; an optimum system that is technically and economically feasible today, without compromise to service.

I doubt that any technically well-informed person reading this would deny the existence of adequate temperature, pressure, differential voltage, time, sound and liquid level measuring techniques that duplicate or excel the sensing and recording abilities of humans presently employed in monitoring or

reporting functions at pumping and valve stations. While admitting the existence of these system elements, we must also acknowledge the fact that they are faster, more consistently reproducible, and less subject to the common cold and the Saturday night binge than their human counterparts. It is no secret that these measuring and metering elements can deliver signals directly to a logic circuit — special-purpose computer if you wish—so that signals representing several functions can be integrated in the same manner that the human mind would integrate them to reach logical conclusions.

Systems available

The point has been made that transducer and computer techniques are available to do a fast, accurate, and dependable job of reading, comparing, and analyzing operational parameters at efficiency levels unattainable by manual means. We must now ask why the obsolete and inefficient manual systems are still employed. The answer to that question is usually the prosaic observation that man, though inaccurate and temperamental, has hidden virtues in his ability to double as a maintenance monitor on routine duty and a maintenance laborer in cases of emergency.

Surely, the gas pipeline industry has existed for a long enough period of time so that numbers can be placed on the cost of these virtues with respect to their true value. A hand occasionally laid on a journal box can never substitute for a temperature transducer in sensitivity or in constancy. Seat-of-the-pants judgment of vibration will never compete for accuracy or constancy with the vibration pickup. Visual oil flow gauges and tach indicators examined on an occasional basis give small guarantee of operational safety and efficiency when compared with automatic monitoring and control devices. And the human ear, with its susceptibility to human system frailties, is one of the most erratic and unpredictable detectors employed by industry. Its low response to noise amplitude changes under high ambient noise conditions leaves it with principally a frequent discrimination function under normal pumping plant conditions.

Constant job

In other words, there is reason to doubt that an operations man is really paying his way in a monitoring function. After all, the special-purpose computer that we just discussed need only to be expanded slightly to do a constant monitoring job on the critical functions periodically checked by the man and, while monitoring these functions, it could check and analyze hundreds of more subtle functions that the man could not possibly check. Not only that, but all of the monitored data could be constantly integrated into logical decisions in anticipation of trouble instead of in response to trouble. Okay, so the logical automatic system takes over—in case of trouble can it repair the fault? No, certainly not. However, it can be expected to do more in maintaining operational constancy in times of trouble than can manual systems.

In anticipation or responding to trouble, a properly programmed com-

puter could be expected to shut down the troublesome unit or alter its operational adjustments while simultaneously adjusting parallel units to compensate for the crippled unit and at the same time signal for maintenance. The computer could even be arranged to alter all control parameters of prime and auxiliary equipment in associated pumping stations to provide necessary operational safety factors.

Furthermore, the control computer could provide maintenance people with a written record of the reason for shutdown and thereby reduce considerably the search process that presently consumes such an unreasonable portion of maintenance down time. I have the feeling that most of you are pretty well ahead of me in this thinking, having probably indulged yourselves in discussions of "flying squad" versus stand-by maintenance many times in the past, so I will not further belabor the point.

Central control

However, the build-up concerning the use of transducers and data-handling systems in the pumping station would have only minor value if not associated with consideration of the really big payoff to be expected from automatic system control in gas transmission. The payoff lies in central control of operational maxima on a second-by-second basis, and administrative control through instantaneous acquisition and utilization of data for purposes such as billing, payroll, purchasing, forecasting, preventive maintenance scheduling, and disaster prophylaxis.

Great time savings

Once the automatic pumping and valve stations exist, you will agree, I am sure, that the electrical outputs of their transducers and computers can be fed more readily and accurately into a communications system than can manually collected data. In fact, it is conservatively estimated that all of the operational parameter data handled in a month by a typical hand-fed microwave chain could be compressed sequentially into less than one hour of transmission time on a single channel if the channel were fed by properly arranged data integrators under the control of a master computer. This master computer, located at a central control or dispatch point in the line, could be either specially designed equipment or a general-purpose computer, such as those showing up in more and more industrial, commercial, and government installations every day, possibly even in your offices. This type of equipment is not experimental. It is standard, dependable, and efficient.

Automatic control... In most cases, the "high cost" excuse will not stand up

Now, we have the automatic stations, the general-purpose computer, and presumably a stable, dependable communications system tying all of the elements into a composite package. I put in the word "presumably," not as a dig, but rather as an acknowledgment of the fact that some lines are currently suffering with microwave systems that need only a couple of more antennas and repeaters strategically thrown into the line to eliminate reliability problems.

New era for industry

Tieing the three major sub-systems into a master system opens the door on an entirely new era in the gas industry. Looking at it from the dispatch point of view, constant system scanning of critical values, such as input and output pressures, temperatures, velocity, and rotational rate parameters, by a computer capable of storing, comparing, and instantaneously integrating the fantastically large data volume generated by a thousand or more miles of operating pipeline can provide operational efficiencies previously undreamed of.

For example, by simply programming a rule into the system, pump rotational speeds could be variably governed to maintain station output pressures to within a fraction of a pound of the maximum pressure threshold—regardless of sporadic pump shutdowns and other such trouble conditions—within the design limits of the transmission system. The payoff here lies in the fact that just one pound of pressure lost at the output of each station in a system results in a mighty sizable system throughput loss. Operational efficiency has real meaning when we consider that a 30-in. line section operating at 800 psi at one end and 500 psi at the other end loses approximately 1.5 MMcf of gas throughput per day if the 800-lb pressure drops only 1 lb to 799 lb. Percentage-wise, this figure is insignificant but dollar-wise, it is appreciable because 1.5 MMcf represents the average daily consumption of a typical 10,000- to 15,000-home residential area in the northeast.

The other advantages of instantaneous and anticipatory dispatch are numerous and could probably be the subject matter of another dissertation. The administrative control advantages to be found in an automatic system constitute yet another entire field of discourse. I will sum up by expressing the opinion that advanced control benefits have been available to the gas industry for quite some time, but that fear of failure—inspired by you and me—has so diluted ambition that nothing significant has been accomplished. Progress has been waiting on confidence. You can inspire this required confidence by direct means. If your communications system can handle control signals dependably, let operations and administration people know about it. If you can't offer reliable data-handling conditions, find out why and correct the situation. Yours is the responsibility for tieing the system together into a neat package. Do it and you are a hero—fail to do it and you will probably watch a successor do it for you. ■

Joint-by-joint welding uniformity helps

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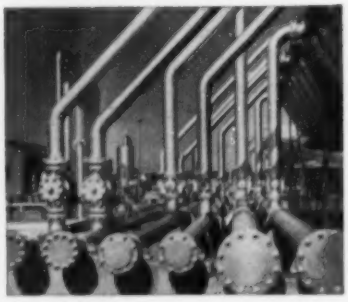
CHAIN for every requirement in the oil and gas industry is made by Republic's Bolt and Chain Division. A complete range of sizes is available in chain for binding, hauling, hoisting, and towing—boomer chain, spinning chain, winch line end chain, truck and tractor tire chains. Republic has coast-to-coast warehousing to assure prompt delivery. For immediate details contact your oil country distributor.

ALLOY STEEL STUDS are widely used on jacket water coolers in gas booster stations. Another quality product of Republic's Bolt and Chain Division, they're available in a choice of alloys to meet varying application problems. Clean, accurate threads assure easy tightening, maximum holding power. Specify them on your next job.



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REPUBLIC ELECTRIC WELD LINE PIPE

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FAST WELDING

DEPENDABLE RESULTS

Ask welding crews who work with Republic Line Pipe. They'll tell you they can pick any two joints of this pipe at random and find equivalent welding characteristics.

The thickness of the wall throughout each joint is consistently uniform. Every end has an accurate bevel that assures a solid base of uniformly thick steel for the root bead. Costly burn-throughs are rare because the even distribution of metal means *no thin spots.*

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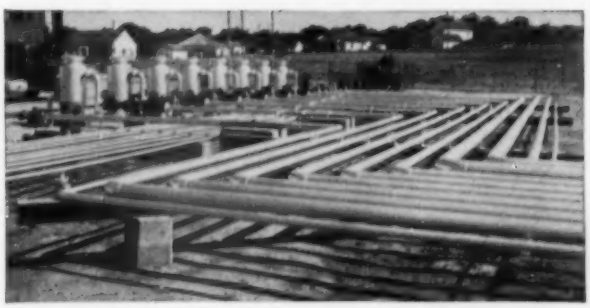
The highly ductile steel permits smooth bends in the field or shop. Uniform high yield strength of the steel assures extra years of trouble-free service for Republic Electric Weld Line Pipe —even in high-pressure lines.

For any job—gathering, transmission, or distribution—Republic can furnish the proper pipe. Electric Fusion Weld comes in sizes 24" through 30" O.D.; Electric Resistance Weld in sizes 2⅜" through 16" O.D.; and Continuous Butt Weld from ⅛" through 4" nominal.

Contact any Republic sales office. Or send coupon for literature covering details.



At this tank truck terminal, Republic EW Pipe provides complete dependability in both low and high pressure jobs. Republic EW Pipe is carefully checked for flaws and wall thickness before being formed and welded. The weld is as strong or stronger than the wall itself.

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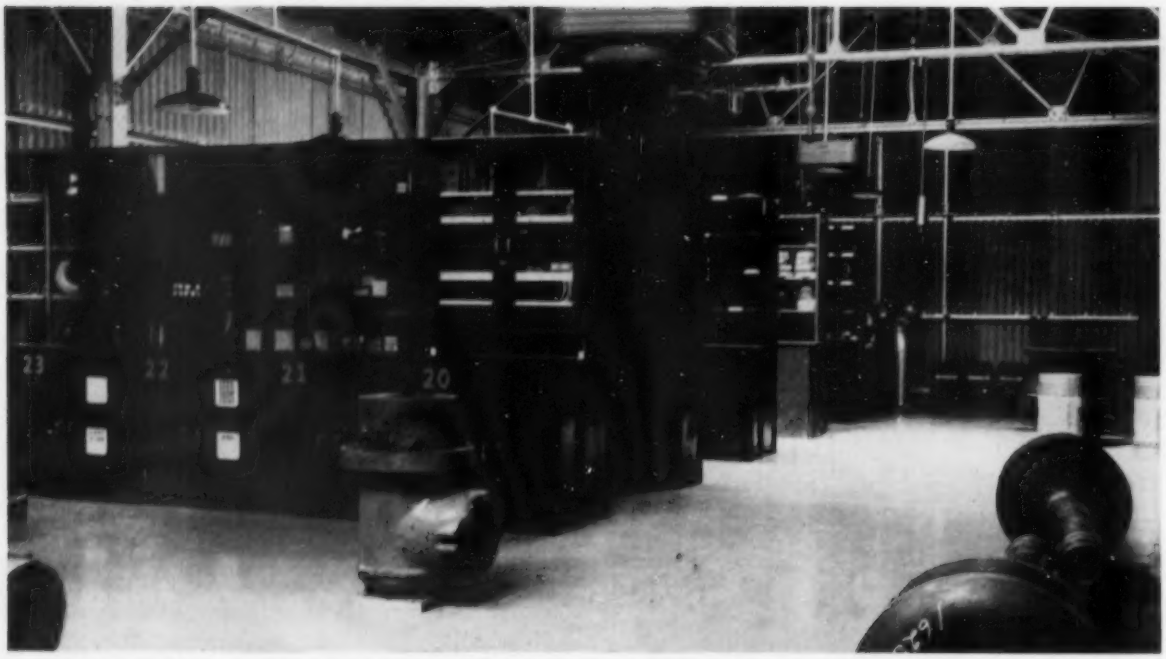


Northern Natural's Palmyra warehouse is neatly arranged with marked bins for small parts and ample storage for larger items. Parts are stored at 29 of the 33 compressor stations on Northern-Permian Basin Pipeline Co. system.

Northern Natural cuts overhead with spare parts control system

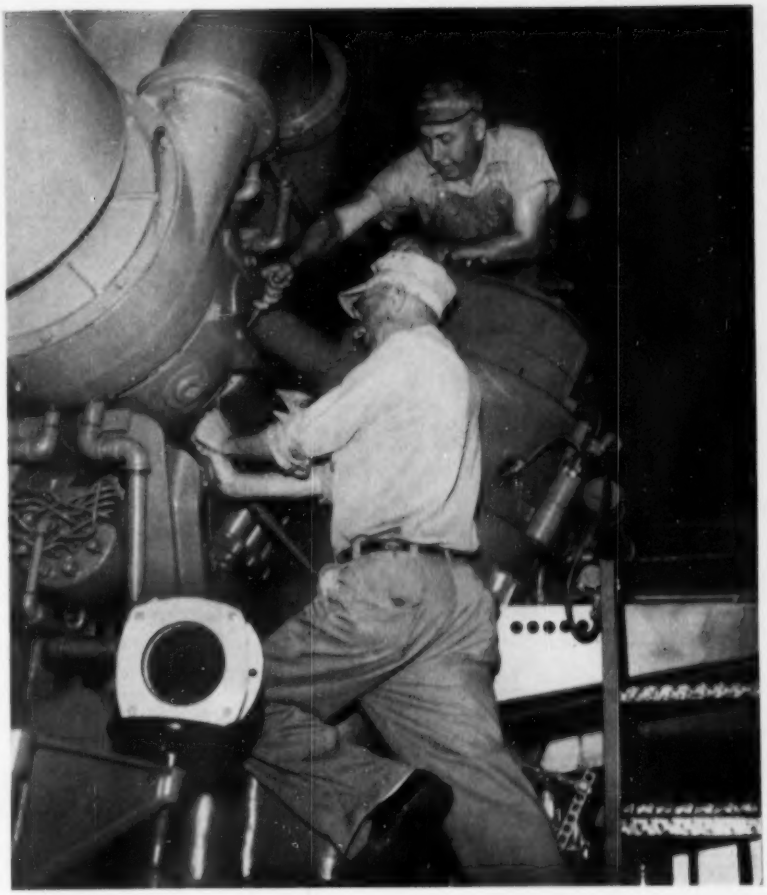
EMERGENCY! A compressor unit is down and a vital part is needed. Northern Natural Gas Co.'s Palmyra (Neb.) Compressor Superintendent Roy Spratt makes a hurried call to the Omaha office. Failure to get the part could mean a cut back in natural gas deliveries and more often than not the needed part can be found in one of the 29 station warehouses on Northern's system.

"Just a minute and I'll check," says Bob Selah, compressor clerk in Northern's Omaha office. He quickly checks through his system-wide spare parts inventory report and in less time than it took to make the call finds that the needed part is warehoused at Oakland, Iowa.

"Hello, Roy, we've got the part at Oakland. I'll call Art (Superintendent Art Minchow) and make arrangements to get it to you as soon as possible." As Selah hangs up the phone he mentally chalks up another mark for spare parts inventory control.

"Spare part inventory control" is a system designed to keep track of spare engine parts stored at Northern's compressor stations. It had its beginning

Palmyra compressor station superintendent Roy Spratt calls Northern headquarters in Omaha (left) to locate part that will put engine back on line. At right, clerk Bob Selah uses spare parts inventory report to locate needed part.



Expansion joint, located through inventory control system, is installed in vertical engine by Northern mechanics Tom Kelly and Ira Stanley.

in January 1954 and is carried on jointly by the compressor and accounting departments. It is a part of a materials and supplies inventory control system in operation throughout the company. First tried in the compressor department, the system has been extended to all operating departments in addition to Peoples Natural Gas division, Northern's retail division serving 103 communities, and Northern Natural Gas Producing Co., a wholly owned subsidiary.

Had it not been for the control system, Palmyra Superintendent Roy Spratt could have had considerably more difficulty in locating the part he needed. Without accurate inventory records, it might have been necessary to order the part from the manufacturer, causing a delay of several days . . . or possibly weeks.

Functional system

Emergencies are the exception rather than the rule, but the control system is not designed just for times of emergency. It's a functional plan designed to answer the routine questions that come up every working day.

Here's a typical example: Every spare parts requisition forwarded to the compressor department in Omaha for approval is checked to see if any of the items might be available in excess at another location. If so, a stock transfer is issued transferring the part to the station where it is needed, thus saving the cost and time of ordering it from the manufacturer and at the same time reducing an excessive inventory.

As far as costs are concerned, the expense of developing and maintaining such a system is relatively small when you consider that Northern's investment in spare engine parts is in excess of $1.7 million.

The first step in developing the system was the cataloging of over 5000 different types of spare parts. These 5000 different types total some 70,000 individual parts. Cataloging was a tremendous job requiring an accurate description and value for each item, assignment of a catalog number, and cross-referencing of all interchangeable parts.

Preparing the catalog was complicated by the fact that Northern's compressor stations were built over the entire 25-year period of the company's history and the units in use were made by seven different manufacturers. Consequently it was necessary to catalog parts for 13 different types of auxiliary engines, 33 different types of compressor cylinders and 22 different types of compressor engines. Over the years, a great many of the major assemblies on the older units were radically changed to incorporate new advances in engineering, thus making manufacturers' catalogs unusable as a guide in preparing Northern's catalog.

The resulting 380-page catalog took approximately eight months to complete. It is divided into three broad classifications—auxiliary engine parts, compressor cylinder parts and compressor engine parts. These three major groups are broken down into specific classes based on manufacturer. In all, there are 18 classes assigned to engine parts. Within the class, each type of unit is listed, broken down by major assemblies and their component parts in alphabetical order. The breakdown is natural and already familiar to field operating personnel, making the catalog easy to use and understand.

To make certain that the catalog description of the part corresponds to the actual part in the warehouse, each part is marked with the catalog identification number, thus making positive identification in the future a simple matter. The catalog numbers are also used on requisitions when new parts are ordered and all manufacturers have been supplied with copies of the catalog to assist them in filling orders more accurately.

Revisions

Provision was made to revise the catalog as often as necessary when new parts are to be added and obsolete parts dropped, or whenever it is necessary to correct an error in the original listing. The entire catalog is set up on machine accounting punch cards with a master card on file for each type of part. Revising a page of the catalog is simply a matter of running the master cards for that page through the

Mechanic Tom Kelly checks out a replacement part from warehouseman Albert Rulla, who notes on control form that part has been put in use.

machine accounting tabulator, incorporating the changes. The new page is printed in two or three minutes compared to about 45 minutes for typing a page of such highly technical material.

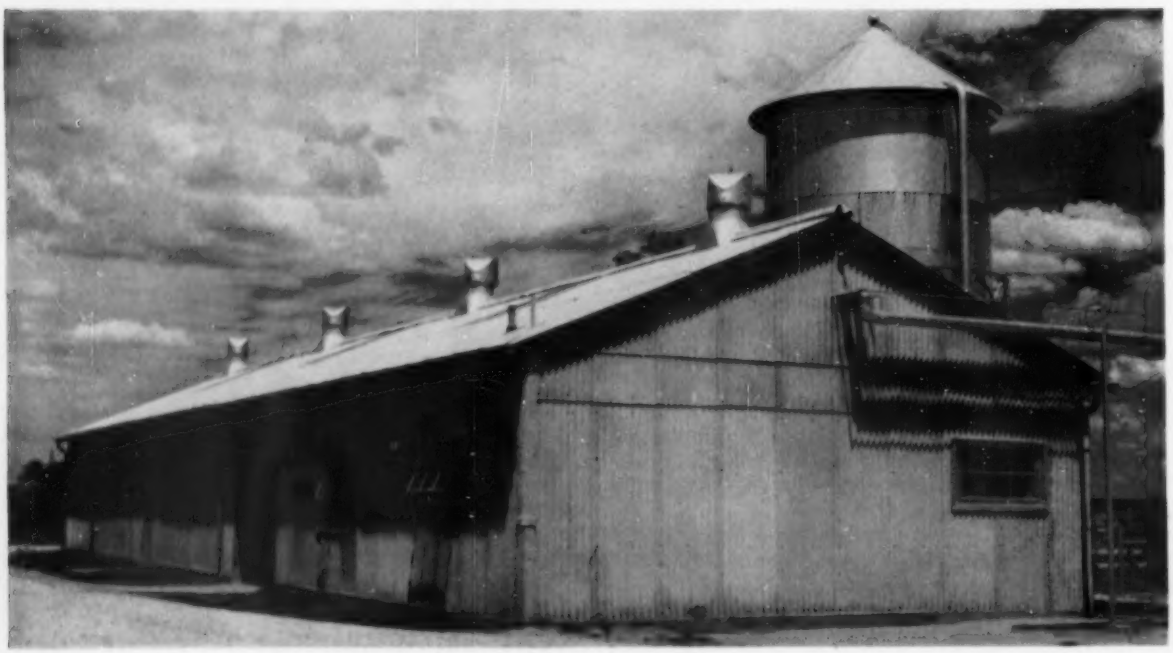
Although cataloging and the resulting positive identification of all parts is the foundation upon which the whole system is based, it would be of little value by itself. To put the system to work so that it would accomplish its primary purpose of control, it was necessary to devise a method of reporting spare parts activity. There are some 1500 to 2000 transactions monthly, that is, parts received in stock, used in maintenance, or transferred from one location to another. These transactions are reported from the field as they occur. From these field reports, a machine accounting card is punched for each transaction. These transaction cards plus some 12,000 "balance forward cards," which carry the previous month's balance of each item at each location, are used by the machine accounting section in preparing the following monthly reports:

1. The monthly inventory of spare parts which lists all parts and shows date of last transaction, where warehoused, unit price, quantity on hand, year-to-date use and total value. It is on a system wide basis and is especially valuable to the compressor department in locating parts stored at one location which are needed at another location.

2. The detail spare engine parts ledger is similar to a monthly bank statement. It shows the spare parts activity and year-to-date usage for each warehouse and is particularly important to the compressor superintendent of the location concerned. It provides a complete record which he can check against his station inventory thus detecting any errors with a minimum of delay. The year-to-date usage column is of special interest to the superintendent since he can readily see which items are not used at all or needed so infrequently that the number on hand should be reduced.

3. The materials and supplies summary report shows the month end money balance and the amount of increase or decrease in inventory value for the current

Typical of the parts warehouses along the Northern Natural line is this one at Palmyra, Neb.



month and the year to date, of each class of material at each warehouse. Management finds this report especially helpful since it quickly points out large increases or decreases in inventory which require attention and shows the trend which the overall inventory is taking.

Since the usefulness of these reports is directly related to how current they are, speed in preparing them is essential. About four working days prior to the end of the month a cut-off is made by the accounting department and all reported transactions received up to that time are included in the reports for that month. Approximately a week later, or about the first or second day of each month, the reports are completed.

The key to keeping the reports current is the electronic calculator used by Northern. The calculator is able to process 100 punched cards per minute, or for example, it can take a "balance

Electronic calculator

forward card" for the previous month, four transaction cards, a new balance forward card and complete 18 calculations in three and one-half seconds. This compares with approximately five minutes to perform the same operation manually. The calculator is selective, too. In computing the new average price of parts after a purchase has been made the calculator will stop and flash a red light anytime the new price exceeds the old one by 50%. Thus the price paid for the parts can be checked to make certain the company has not been overcharged.

While reduction of stock is a natural and desired effect of any inventory control plan, it is not the first objective. As Northern's Superintendent of Compressor Stations A. L. Vaughan points out, "It would certainly be undesirable to reduce stocks to a point which would interfere with company operations. Northern's system is designed with the thought in mind that the lack of a single part can stop an engine and consequently the primary purpose of the system is not to reduce inventory, but to make the most efficient use of it. In effect, it enables the compressor department to operate more efficiently with a smaller inventory and therefore a smaller investment in spare parts."

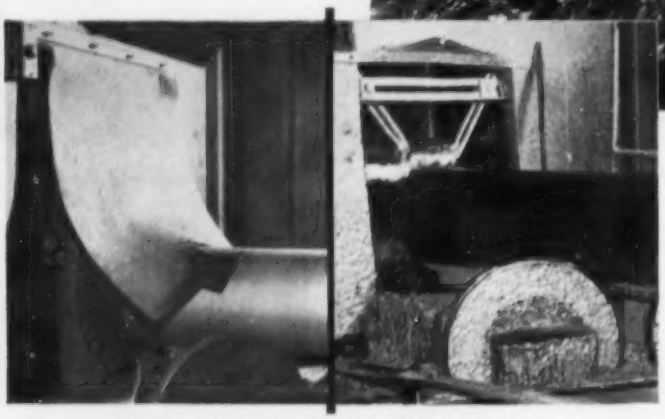
The new system has proved its worth in other ways, too. Complete data on interchangeability of parts which can

Machine accounting department key punch operator in Northern headquarters in Omaha transfers information on issuance of part from stock issue ticket to punched card. Below, a Northern employee keeps an eye on the tabulator as it prints one of several reports required for spare parts inventory control each month.

be used on various types of equipment are immediately available. Costs are more easily controlled since the compressor department has a complete picture of what actual maintenance costs are. These cost studies in turn provide a guide for future purchases and replacements of compressor equipment. In addition the reports provided by machine accounting give management a monthly check on inventoy values and thus many problems may be averted or remedied before they become serious.

The test of any system is its ability to perform day after day doing the job it was designed to do. Spare parts inventory control has met that test by combining operating economy and convenience with the essential control needed by management to guide the affairs of a major transmission company. ■

YOU CAN JEEP ENAMEL BUT NOT ITS BOND



WARM PIPE LEAVING WHEELABRATOR AND PRIMING BOOTH IN TEMPERATURE CONTROLLED ROOM.

In SPI's plant, all moisture, rust and scale is removed from your pipe by warming and steel grit cleaning in temperature controlled rooms. The primer is applied immediately to seal out all dirt, dust and moisture. The steel grit cleaned surface of the clean, dry pipe, made up of many tiny facets, provides ideal and long lasting bond of the enamel to the pipe.

Field conditions prohibit such exacting procedures. Wire brushing does not produce the many tiny facets needed to provide ideal bond. Moisture may condense on cold pipe and dirt and dust carried by the wind may collect on it before the primer is applied. When the pipe is jeeped, this dirt and moisture may not show up as holidays, but later, when field c/w pipe is underground, costly holidays may result because of poor bond.

REMEMBER, YOU CAN JEEP ENAMEL BUT YOU CAN'T JEEP ITS BOND.

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GAS progress reports

NEW CONSTRUCTION PLANNED

MOUNTAIN FUEL SUPPLY CO., Salt Lake City. To build 38 miles of 20-in. line and compressors to transport from Sweetwater county in southern Wyoming 60 MMcf/day purchased from Pacific Northwest Pipeline Corp.

NATURAL GAS PIPELINE CO. OF AMERICA, Chicago. Dockets G-9934, et al for 25 miles of line extending from Quinduna field, Roberts county, Texas, to a connection with its system; 5280-hp compressor in Quinduna field, and various field lines and metering facilities.

PIEDMONT GAS CO., Hickory, N. C. Docket G-10061 for 78 miles of 8-, 6-, 4-, 3-, and 2-in. line to connect with facilities of Transcontinental Gas Pipe Line Corp. to serve various areas in North Carolina.

CURRENT CONSTRUCTION

AMERICAN LOUISIANA PIPE LINE CO., Detroit. Docket G-2306 to construct 1289 miles of line—30-in. from North Tepetate, Acadia parish, La., to connect with Michigan Consolidated facilities near Detroit; 24-in. to feed into 30-in. line in Louisiana, also three 10,000-hp compressor stations. Brown & Root has laid 73 miles, Houston Contracting 142 miles, H. C. Price 156 miles. All major river crossings are complete. Completion is scheduled for June 1956 and project is on schedule.

ARKANSAS LOUISIANA GAS CO., Shreveport. Docket G-2307 for 134 miles of 6⅝- to 24-in. line in 11 sections, and 10,500-hp compressor station on its system in Arkansas, Louisiana, and Texas. Compressor station and 71 miles of line completed.

COLORADO INTERSTATE GAS CO., Colorado Springs. Docket G-2121 - (1956 program) 239 miles of 22-in. line from Laramie, Wyo. to connection with Pacific Northwest Pipeline Corp. line at Green River, Wyo. R. H. Fulton started two spreads April 15. Completion by Nov. 1.

MISSOURI PUBLIC SERVICE CO., Warrensburg. Docket G-2057 for 109.3 miles of 8- and 10-in. mainline and 27.1 miles of lateral lines. System to connect with Panhandle Eastern Pipeline Co. line at New Franklin, Mo. and extend northwest. O. R. Burden Construction Co. started work on line in May. Expect completion in September.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Docket G-9860 for 27-mile extension of existing line to extend line from Elk county, Pa. to new Luthersburg gas field in Clearfield, Jefferson, and Indiana counties, Pa. Harford Brothers started construction April 2. Proposed completion: July 1.

PACIFIC NORTHWEST PIPELINE CORP., Houston. Dockets G-1429 and 8932 et al for 1487 miles mainline; 443 miles of spur and lateral lines; and 13 mainline compressor stations totaling 83,500 hp and 2 booster stations totaling 4620 hp, to extend from Ignacio, Colo., in the San Juan basin, to Sumas, Wash. (Canadian border). Fish Northwest Constructors Inc., builders of the line, have let contracts to River Construction Corp., R. H. Fulton & Co., Associated Pipeline Contractors, A. J. Curtis Construction Co., B. & M. Construction Co., Midwestern Constructors Inc., H. B. Zachry Co., and Fulghum Construction Co. for first 1061

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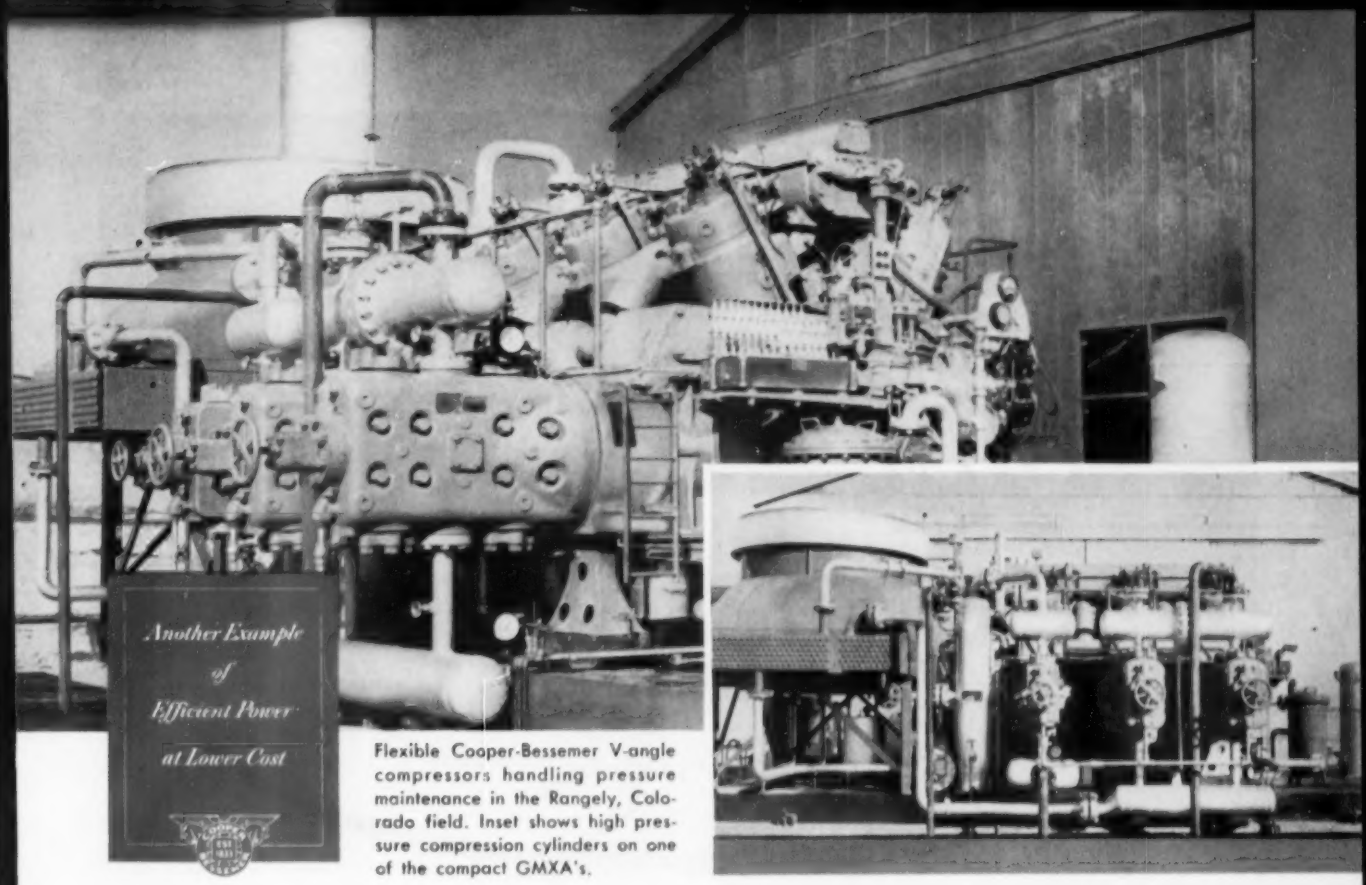

Flexible Cooper-Bessemer V-angle compressors handling pressure maintenance in the Rangely, Colorado field. Inset shows high pressure compression cylinders on one of the compact GMXA's.

• How **PACKAGED COOPER-BESSEMERS** "keep pressure up, costs down" in the Rangely Field

HERE, eleven Cooper-Bessemer GMX and GMXA compressor units are keeping pressure maintenance *and costs* "well under control."

Located in four different stations, these 330 and 375 hp Cooper-Bessemer compressors handle pressure maintenance with minimum attention and maximum operating effectiveness.

Designed especially for this type of field service, these tested Cooper-Bessemers save time and installation cost because they're packaged and skid mounted . . . . fully assembled and ready to go to work in a hurry.

If field requirements should change, these compact units can be transported by either truck trailer or railway flat car. Except for the concrete slab foundation and a minimum of connection piping, the entire installation can be quickly moved and re-installed for economical and dependable service in another location.

For complete details on these and other heavy-duty Cooper-Bessemer V-angle compressors, ranging in horsepower from 200 to 3000, consult the nearest Cooper-Bessemer office listed below.

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- **reduces missed and misunderstood messages**—operators hear only messages within their own operation.
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- **increases area coverage**—"coded squelch" circuit automatically maintains optimum receiver sensitivity, assuring maximum communications range at all times.
- **easier to operate**—no additional buttons, lights, adjustments or operational techniques—elimination of squelch adjustments makes it even simpler to operate than conventional two-way radio.
- **reduces operator fatigue**—elimination of "channel chatter" enables operators to concentrate on their jobs—reduces tension, providing a more pleasant atmosphere—increases job satisfaction.
- **selective**—This amazing new circuit opens the speaker only when receiving a properly coded transmission from a PRIVATE-LINE radiophone in the same operation. NUISANCE NOISE, MESSAGES FROM NEARBY SYSTEMS ON THE SAME CHANNEL, AND SKIP INTERFERENCE FROM DISTANT SYSTEMS *CANNOT* UNLOCK THE SPEAKER.
- **automatic**—does not require manual adjustment—electronically maintains feather edge sensitivity at all times.
- **silent**—coded subcarrier is inaudible—normal carrier-off noise burst or "squelch tail" is eliminated from the output of mobile receivers.
- **built-in**—tone circuitry is incorporated as an integral part of compact transmitter and receiver chassis.
- **precise**—Motorola's exclusive VIBRASENDER and VIBRASPONDER electromechanical resonant tone devices assure precision stability, selectivity, and reliability.

Technical men will be quick to note that PRIVATE-LINE radio does not employ a conventional tone-pulse selective calling system, but, instead, a continuous inaudible tone-coded subcarrier system which opens the speaker only for calls from transmitters in the system. Interfering signals cannot "trip-open" or "lock-in" the speaker, since only the properly tone-coded carrier keeps speaker open.

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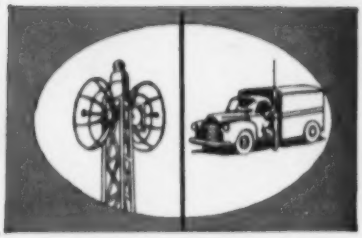


By FRANK CHAPMAN

Cybernetics for pipeliners

This column has been adapted from a talk presented by F. Vinton Long, chief of the communications section, Engineering department, Texas Eastern Transmission Corp., at the May meeting of the Petroleum Industry Electrical Association held in Dallas.

MANY many years ago, a man in a white nightshirt devised a gimmick which we are just starting to use today. The man in the nightshirt was an ancient Roman and the nightshirt in those days, was called a toga. This Roman invented a hydraulic float valve to automatically control the water level in storage tanks. He created a sensing device which was capable of making certain limited observations and thus causing certain rigidly specified action or processes based upon these observations. In other words, when the water came up to a certain level, the flow ceased and the tank did not run over. That was a long time ago.

About 150 years ago, several more people, without togas, contributed still more to the art of control. They were Charles Cabbage, from Cambridge, England (a mathematician), J. M. Jaquard (a French weaver and mechanic), and Eli Whitney from our own country.

Dr. Cabbage invented his difference engine (an electrical engine) and he died without seeing the results. But his invention was the first digital computer. Also, Eli Whitney believed in mass production, and helped revolutionize the industry in the southern part of the United States.

Monsieur Jaquard, the Frenchman, devised the principle of storing control information on a punched card. He did this in order to obtain a means for reproducing certain patterns on tapestries.

This means that the idea of complex computation devices and their use in the control of industrial processes is many, many years old.

Why is it then, that only in the last few years has this technique of automation and control received the interest and publicity that it has? The answer is electronics and communications.

Control of any dynamic operation is impossible without the concept of feedback. Feedback is impossible without effective communications.

The future

The really great advances in industrial automation and control are still in the future. The delay has been caused by a lack of adequate communications, but these facilities are available now; with good communications we can now use computers.

This does not mean that computers can think. They cannot and I hope they never will be able to do so. However, they can store the criteria for certain decisions, and from true and false choices from their memories, deliver certain specific information which can be used by man to further his knowledge and decisions.

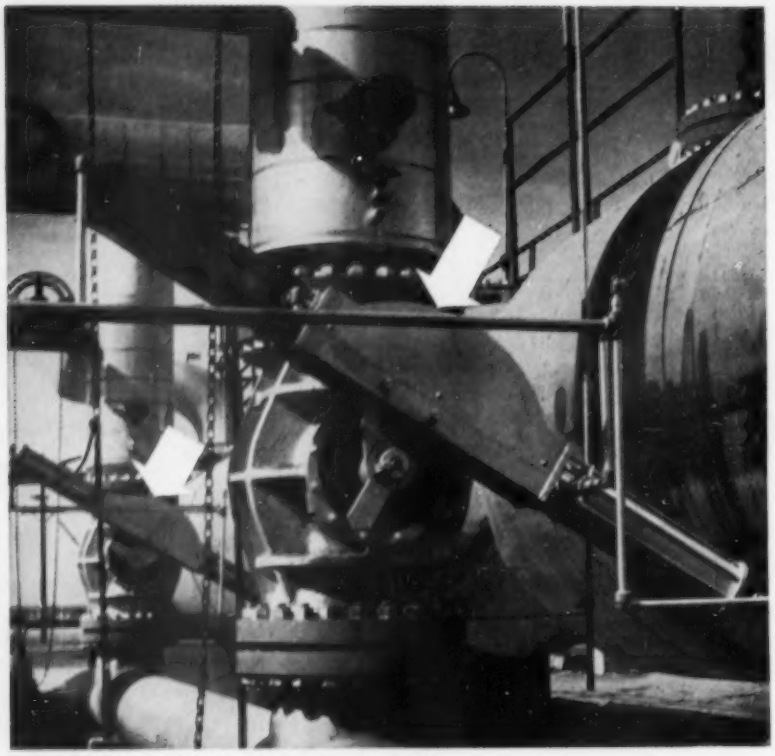
About 1943, a group of scientists working with Dr. Rosenblueth of the University of Mexico, and Prof. Norbert Wiener of M. I. T., became aware of the essential unity of the several problems centering about communications, control, and statistical mechanics. Whether in the machine or in the living tissue, there was a lack of common terminology or even of a single name for the field. Those men decided to call the entire field of control and communication theory, whether in the machine or in the animal, by the name Cybernetics, which is derived from the Greek word for Steersman.

Pipeline information can now be automatically combined — mechanically, or electronically, so that it can be presented in a simple manner to the man in charge of operating the line. Our existing use of telephonic communications and the phoning in by voice of pressures and temperatures and other bits of information, is to be replaced by a method which would do this automatically. It will automatically make the calculations. This means that the man in charge of the line at that moment can devote his time to do the thing which man is more capable of doing and that is to think, plan, supervise, and to use his intelligence in maintaining the utmost efficiency in the overall operation of the line and not be concerned about bits and pieces of information which might take up all his time. He is there as a director and not as a mathematician or a calculator of bits of information. The machines are here to do that for him. It can be done ably and simply, and not expensively.

Paid for thinking

We wish to pay that man *to think*. The full use of the machines which are now available for pipeliners would make it possible to automatically control and direct the purchase, transmittal, sale and delivery of materials such as gas, products, and crude.

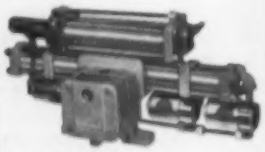
Those functions can be carried out simultaneously. You can have a continuous picture of line operation; at



(Unretouched photo of Ledeen Valve Actuators in operation)

AMINE RECOVERY PLANT PLUG VALVES OPERATED BY LEDEEN VALVE ACTUATORS

Natural gas companies find these operators safe, positive, dependable for automatic operations



LEDEEN TIME DELAY VALVE

When lightning strikes or power fails, this new valve keeps station on line. If power is not restored within adjustable time delay limit set by the valve (2 seconds to 2 minutes), station is blown down and lines vented. Write for data on this compressor station watchdog.

Ledeen Valve Actuators are used in compressor stations on automatic blowdown valves, fuel shutoff valves, relief valves, pipeline and station block valves, and many more applications along with the Amine Recovery Plant installation shown.

These valve actuators are pneumatically and hydraulically operated, do not leak and are easily mounted by field personnel without modification of plug valve. They can be mounted in any position around the valve; and are available with auxiliary manual operation, either at valve or at a remote location. For preventive maintenance, actuator and control system can be operated without turning the valve. Torque ranges from 500 to 500,000 inch pounds.

WRITE FOR BULLETIN 3020.

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VALVE ACTUATORS
AIR HYDRAULIC
PUMPS & BOOSTERS

Ledeen Mfg. Co.
1608 So. San Pedro St.
Los Angeles 15, Cal.

the same time you can see how much your sales are, your purchases are.

There are two points which should be emphasized—we must not forget.

First, the use of Cybernetics in pipeline operation will not be here completely tomorrow or next week or even at the next meeting of the PIEA and the PESA. However, the trend is here . . . the trend is here because it is a valuable tool to management and operating personnel alike.

The second point is that the prime purpose of the use of Cybernetics, remote control, and to a very limited extent automation, is not to do away with the human, it is to increase his efficiency.

But if we can arrange it so that these people can perform more intelligently, can devote their time to supervision rather than routine duties; then we have gained. That is what we are after.

We do not want to take off in a big cloud of dust, give it full throttle, and say "Boys, we are going to control everything automatically, we are going to do away with all the people and we're going to make this pipeline use reverse feedback, triple reverse feedback, half a dozen other peculiar terms, and all our problems will be settled," because they won't be. We will still need people; as in the case of the young housewife who purchased an automatic washing machine, an automatic ironing machine, an automatic dishwasher, and automatic dryer, an automatic scrubber, and when she got through with all that, found that she could fire the maid, but had to hire a mechanic.

The operator of a compressor station will not have to sit along-side his phone for telephone or teletype communication with his dispatching center. This information will flow automatically to the dispatching center and to the control point of his station. He will be free from routine duties. He will be there to think and to plan how to operate his station more efficiently. Probably more important, he will be there for emergencies. *His time will be free to apply to the emergency should it occur.* We need men for that; you can't do that with machines.

We visualize the control of pumping stations or compressor stations along a pipeline will be concentrated in several control points along the line. Each control point will have under its juris-

DARLING

VALVES

What's *SURER* valve performance worth to you?

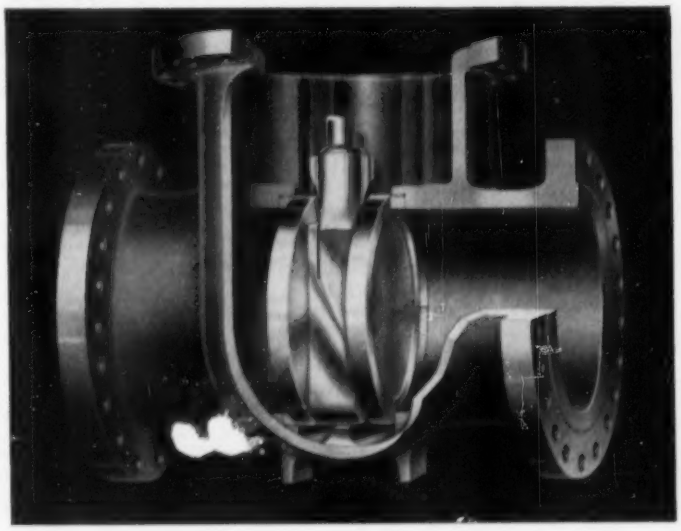
IN your service, the thing about valves that costs the most is down time. Right? And sometimes even *preventive* measures are pretty costly, too!

All right, here's a fact that Darling gate valve users everywhere will vouch for. The Darling *fully revolving double disc, parallel seat principle* means *easier* operation, *surer* closure, less chance of trouble, month in, month out. And you'll save on maintenance all along.

Why not check into Darling gate valves for your requirements? Find out *how* they assure these advantages. We'll gladly furnish general or specific details. Just say the word.

Above top: Darling 30" motor-operated gate valve powered by gas from line pressure.

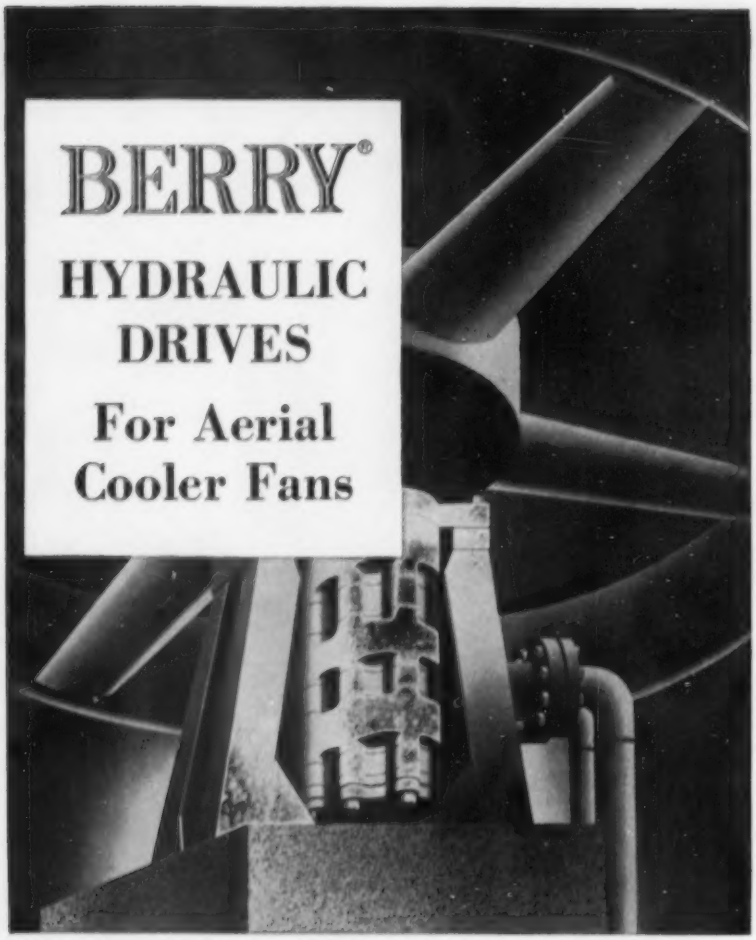
Cutaway, below, shows simplicity of Darling's unique fully revolving double disc parallel seat gate valve principle—just four simple working parts—two plain interchangeable no-pocket discs and two husky wedges.



DARLING VALVE & MANUFACTURING CO.

Williamsport 26, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario



CHECK THESE ADVANTAGES

constant water temperature • The Berry drive makes it possible to maintain a predetermined jacket-water temperature accurately and automatically.

safe • The Berry hydraulic system has the safety necessary for gas transmission equipment and can be located in compressor building at point of use.

simple, trouble-free • Fan may be mounted directly on Berry hydraulic motor shafts, and the pump may be direct or belt driven from compressor flywheel.

saves power • With the Berry hydraulic drive, horsepower used to drive fan is proportionate to the cube of the speed of the fan. Whereas with a mechanical drive, the horsepower remains constant.

complete • System may be designed to integrate compressor and auxiliaries into a packaged unit. Compressor unit may be moved from location to location as needs increase or decrease, without interrupting station operation.

adaptable • With Berry's "stacking" design, *one* Berry hydraulic pump can provide power for a number of Berry motors under various oil flow and pressure requirements.

low overall investment • The integrated hydraulic drive, powered from compressor, eliminates hazardous electrical equipment and additional buildings necessary.

fully automatic • When untended service is a "must," Berry drives can be integrated with other controls to provide automatic compressor stations.

See how Berry fills your needs.

Write for this 8-page bulletin which gives full data on Berry pump/motor "package" units.

BERRY DIVISION
OLIVER IRON AND STEEL CORPORATION
PITTSBURGH 22, PA.

diction from one to five or more stations either downstream, upstream or on both sides of the location. The operator will be complete master of those stations through electronic remote control. This information will come in by leased line, private microwave, or other means, and personnel will reside at those stations for maintenance, emergencies, and other duties which will always be required.

Telemetering information such as line flow, actual Btu sales in the case of gas, description of products shipped, delivered, or purchased, will come into a main dispatching office for the entire line. The duty of this dispatcher is not to control the various pumping or compressor stations on the line. His duty is to sit there *and think.*

He will be able to think because he *doesn't have to be a calculating machine.*

He will be able to look on the wall and see at one glance the entire picture of the line under his control. Through the form, possibly, of an illuminated-glass graphic representation of the lines, he will be able to see the trend of line pressures or of deliveries of his products.

He will be able to see the trend of conditions much better from that distance than if he were trying to assimilate the various bits of information which he has had to do in the past. He has one thing to do: make that line operate smoothly and efficiently with the fullest pack.

He will dispatch orders to his various control men at the control points along the line indicating what is required of their section. How they control the stations involved to provide that condition is *not of his concern.* He provides the overall order; the section control men will carry it out, because *they know* the condition of the pump or compressor stations under their control.

This will cost money, but it will be spent to receive a greater return. This return would not be in the manner of a hypothetical figure of efficiency. It would be returned in dollars and cents, by the saving in personnel released from routine duties to be placed in specified jobs—jobs in which they can use their intellect, do the thinking, help the line operate.

Savings would be accrued from the increased amount of gas, products, or

WHAT'S NEW AT BRISTOL...

RIDING 250-MILE PIPELINE from his desk at Charlotte, N. C., Piedmont's gas dispatcher makes instant decisions with aid of this battery of 1- and 2-pen Bristol recorders. They show pressure, temperature and flow at 46 remote points.

Takes 46 readings over 250-mile pipeline with only 4 wire circuits

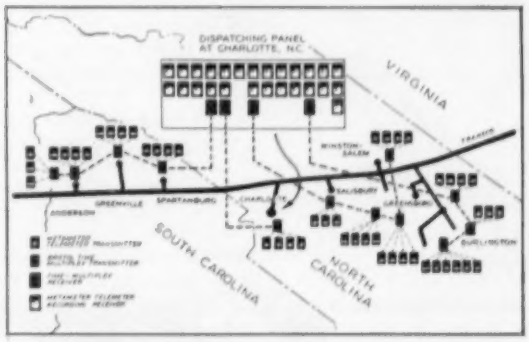
Piedmont Natural Gas Company is first to use new Bristol Intermediate Time-Multiplexing system

With the new Intermediate Time-Multiplexing system, only four leased wire circuits are needed to send readings from 46 telemeter transmitters along Piedmont's 250-mile pipeline to a central dispatching headquarters at Charlotte, N. C.

The close continuous supervision provided by the new Bristol instrumentation system enables operation of Piedmont's complex gas distribution facilities at nearly 99% load factor.

Multiplexed Bristol Metameter Telemeters provide transmission of up to 15 instrument readings over a single wire circuit. With the new Intermediate Time-Multiplexing, these readings may be multiplexed onto the line at *widely separated intermediate stations*—effecting great economies in the number of required circuits.

Find out how these Bristol Metameter Telemeters can solve *your* complex telemetering problem in the most economical manner. Write The Bristol Company, 119 Bristol Road, Waterbury, Conn. 5.45



TWO-STATE COVERAGE with only four leased telephone circuits is effected by this instrumentation system. Note that as many as four intermediate time-multiplex transmitters add readings to a single circuit at different points.

BRISTOL (TRADE MARK REG. U.S. PAT. OFF.) BRISTOL'S)

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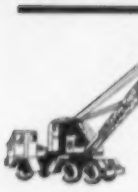
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You can bank on this: BANTAM's versatility lets you handle every assignment quickly and at lowest cost. Digging trenches and bellholes, loading and placing pipe, backfilling and driving piles—these are only a few of the jobs BANTAMS are doing up and down the pipelines—with 9 different fast-change attachments.

Whether your next job is big or little, across the road or across the country, try a BANTAM! You'll agree, it's the handiest rig you can own. Choose the model to fit your needs exactly—Crawler, Carrier or Self-Propelled! Let us give you more money-saving facts about BANTAMS in pipeline work. Use the coupon.

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crude which can be transported in the line during any given period. That is a definite dollar and cent advantage, and will soon pay out.

A sufficient number of channels must be available to adequately control our pipelines.

Economic questions

Whether common carrier facilities or private systems are used is largely an economic question. In every case, an engineering study of the advantage of each type of service is made and from this study management makes its decision.

The common carriers have been and will continue to be indispensable in providing communications service to the entire petroleum industry.

The common carriers have the facilities, the ability, and the willingness to provide any communications service that we require.

We cannot get along without them.

But one thing is clear; if we in the gas and oil industries are to look ahead and take advantage of the forthcoming techniques of automatic control, remote control, *complete* control of our pipelines, we must realize that we will need many communication channels and should *right now* assert our right of freedom of choice between common carrier and privately owned facilities.

Communications must continue to be obtained on the basis of competition and *not* legislation.

We must also keep the avenues open to take advantage of all future developments in the field of communications such as trans-horizon radio, certain uses of mobile equipment, and other means yet undeveloped, in order that we might have a still greater selection of facilities and means.

Competitive spirit

The oil and gas industry has advanced because of good management and the competitive spirit. The common carriers should compete on their own merits, as we must compete. Above all, keep constant vigilance over the freedom of choice of communications we now enjoy.

We in the gas pipeline business are low man on the totem pole in the utilization of remote control, automation and Cybernetics. Next up are the li-

best way to protect pipelines...

SPECIFY NO-OX-ID

Pipeline installations often represent multimillion-dollar investments. Dependable protection of that investment is of vital importance.

That's why leading pipeline companies and utilities everywhere look to Dearborn NO-OX-ID Coating and Wrapper Combinations for long-term protection—for reliable insurance against corrosion leaks and deterioration.

NO-OX-ID Coatings and NO-OX-ID-ized Wrappers provide chemical and mechanical protection against moisture penetration and soil action . . . protection that lasts for decades . . . on installations under ground or under water.

On your next coating job, you'll find it pays to specify NO-OX-ID.

One application of NO-OX-ID Aluminum Protective Coating keeps outdoor storage tanks bright for years.

Why Does Industry Specify NO-OX-ID?

There are many practical, money-saving reasons NO-OX-ID has such widespread preference:

- NO-OX-ID Coatings can be hot- or cold-applied.
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Like to know more?

Then clip and mail the coupon for a factual booklet, "Protecting Underground Pipe from Corrosion with NO-OX-ID and NO-OX-IDized Wrappers." Or, better still, call in your Dearborn Pipeline Engineer and talk it over.

It pays to specify

Dearborn NO-OX-ID®

For Long-Term Pipeline Protection

Dearborn Chemical Company, Dept. G,
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Gentlemen:

☐ Please have a Dearborn Engineer call.

☐ Send me a copy of "Protecting Underground Pipe from Corrosion with NO-OX-ID and NO-OX-IDized Wrappers."

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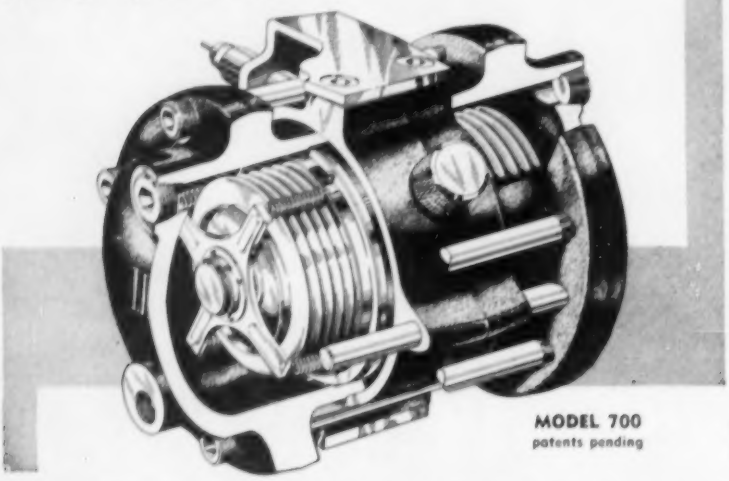

MODEL 700
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Major companies throughout the world have tried the I. I. C. bellows-type flow meter. In their own exhaustive tests they have found it far superior in performance and construction.

The I. I. C. flow meter is a combination of the most modern engineering features:

Seamless bellows—choice of either type 316 stainless steel or Monel.

Exclusive free-floating, non-freezing bearing designed and engineered by I. I. C.

Forged housings—either alloy steel or 316 stainless.

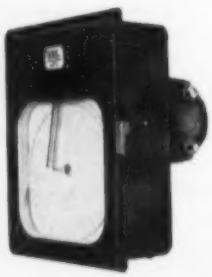
More powerful, this meter gives quicker response and more accurate recording. Pulsation dampener is externally adjustable under pressure. Compensation is provided for ambient temperatures. Affords over-range protection up to housing rating. Working pressures 1,000, 2,500, 5,000 p.s.i., furnished in all standard ranges up to 500 inches of water.

Make your own comparison tests. YOU be the judge.

For full information—including the name of your nearest representative, write for Bulletin 56-B-2—today!

I.I.C. Model 700-MT Transmitter
(Patents Pending)

Model 800-6 Indicator
(Patents Pending)



Model 802 Recorder
(Patents Pending)

INDUSTRIAL INSTRUMENT CORP.

DRAWER 152 ODESSA, TEXAS

communications • *Cont'd.*

quid shippers, then far ahead are the refineries.

There are two reasons why pipelines are way behind:

The first is that no one bothers to engineer out in a comprehensive report form a clear picture to management as to what it takes to employ the art of Cybernetics in our industry.

And two, because management is made up of human beings, they act like most mortals and instinctively recoil from facing a drastic change and venturing into something which is new to them and they do not *initially* understand.

One may ask *why* there are so few good clear pictures and *why* these pictures don't show management *in one-syllable words the simple facts and economics* of this art.

Selling job

The answer is that few of us who know the facts take the trouble to work them up in an acceptable form and sell it to management.

We have been too busy with nuts and bolts, resistors and tubes to let it soak in that we are missing the forest because of the trees.

None of these buckets of bolts or baskets of tubes are of any use to us unless it increases the efficiency of the pipeline or saves us operating costs.

We have been pitifully poor salesmen to management because we didn't realize what a terrific product we had to sell.

We must think big, and talk big, and sell big to management; the benefits they will receive with use of the are of Cybernetics.

We can afford good communications and we now have individual machines which will do almost anything that we wish them to do in the matter of control of our pipelines.

We have machines which will automatically regulate the pressure at wells and change that pressure as desired, by that I mean the pressure into our gathering lines. We have machines which in the case of gas will automatically give us our true Btu sales, will automatically figure out everything needed, and will transmit this information accurately to a control point. We have machines which can accurately regulate the speed of our pumps or our compressors. We have machines with which

EACH year an overwhelming majority of pipeline owners and operators select *coal tar* coatings to protect their long-term investment. And with good reason: No other material can match coal tar coating's *proven* record of economical, long-lasting protection.

Coal tar coatings are amazingly durable. And their life is measured in decades—thanks to their inherent ability to resist soil stress and water absorption, the two big reasons why other materials fail.

If you'd like to be sure of the *best* pipeline protection that money can buy, specify *Pitt Chem* Coal Tar Coatings, just as scores of leading pipeline companies do. When you buy *Pitt Chem*, you buy *assured* pipeline protection with every drum, because *Pitt Chem* Coal Tar Coatings are manufactured to rigid, *published* specifications by a basic producer. If *you* have a pipeline protection problem, chances are we have the answer. *A phone call will place an experienced Pitt Chem man at your service.*

PITT CHEM® TAR BASE COATINGS

Standard Grade · Modified Grade
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communications • *Cont'd.*

we can turn off our pumping units, start them up, open or close valves. We have machines which, if properly employed, can give us advance as to our future pack on the gas line.

In fact, we have machines which will do almost anything we wish them to do, except they cannot do *one thing*. These machines cannot automatically create the wish for our management to use them.

That is one field where the machines must leave off, and turn the chore over to engineers. These machines are our obedient servants, but they must be desired and authorized by our management before they can be installed *anywhere* to help the efficiency of our pipelines.

The management is too busy with matters of overall operations, of finance, of sales, and other matters to worry about these things. That leaves it up to us to use our initiative and clearly demonstrate the value of *Cybernetics for pipeliners.*

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THE NEW Mathey TWIN

41% LIGHTER!

Made of aluminum, treated with special hardening process. Approximately 41% lighter providing fatigue free durable performance. Designated as Series L, it's available in #3-L, #4-L and #5-L, together with the standard rugged #1-S, #2-S, #3-S, #4-S and #5-S Mathey Pipe Cutting and Beveling Machines. There is no machine lighter than a Mathey Twin. There is no machine more rugged than its brother, the regular standard model. You can't beat a Mathey Machine for accuracy, speed and economy.

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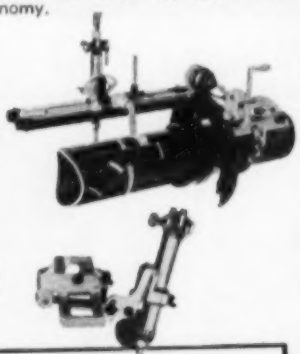
For cutting pipe to weld angular intersections to job requirements. Coupon cutting for welding analysis. Easily operated.



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GAS pipeline news

Canadians agree to loan Trans-Canada $80 million

Both the House of Commons and the Canadian Senate have approved the Canadian government loan of $80 million to Trans-Canada Pipe Lines Ltd. that will enable Trans-Canada to start building its 2320-mile pipeline this summer.

Construction of the first section of line, 600 miles from the Alberta boundary to Winnipeg, Manitoba, will get underway immediately. The loan, which will cover this portion of the system, must be repaid by the end of March 1957 or all the company's assets will be subject to government seizure.

The second section of line—about 600 miles across northern Ontario, where customers are few—is to be built at a cost of $115 million by the Canadian government and the government of the Province of Ontario. The government will lease this line to Trans-Canada.

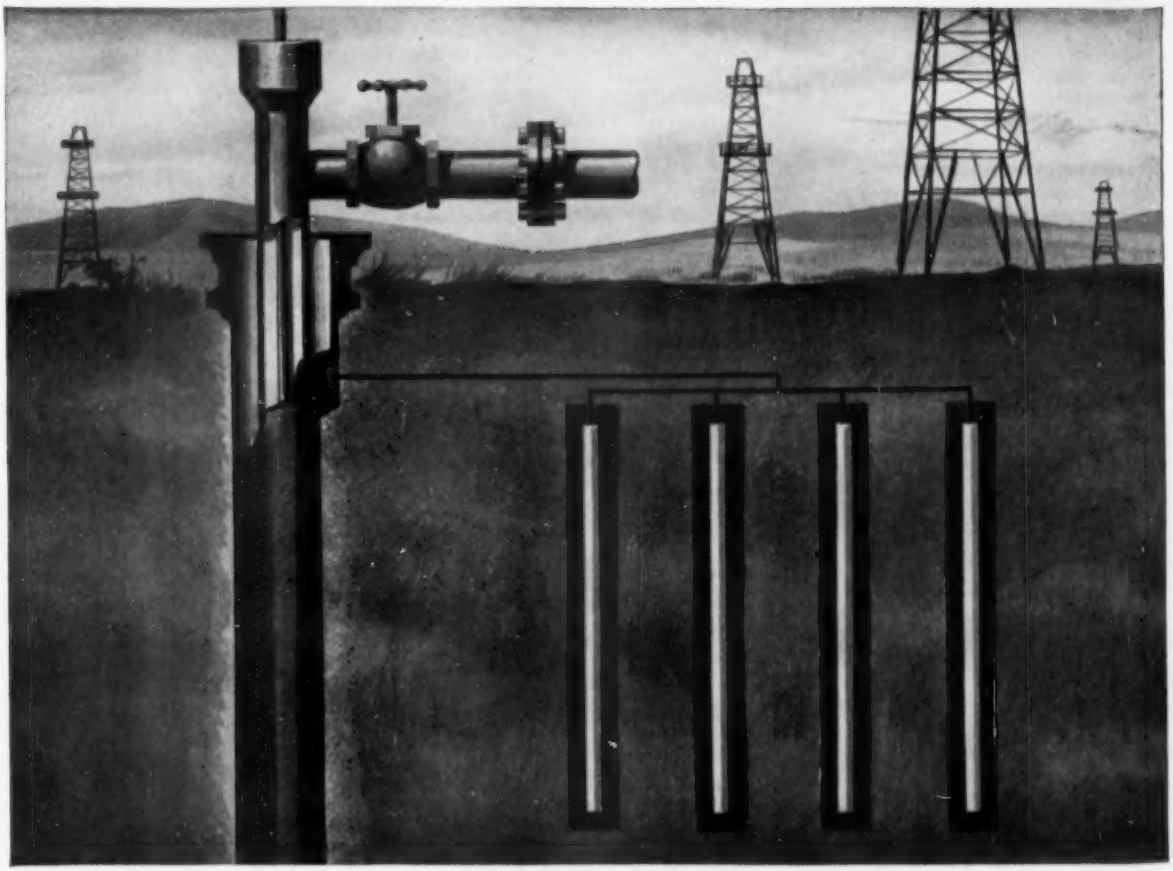
Trans-Canada has pledged all of its assets to repay the loan and has agreed to offer 51% of its stock to Canadian investors when public financing is undertaken.

FPC approves producers sales to Montana-Dakota

Montana-Dakota Utilities Co., Minneapolis, has final FPC authorization for new pipeline facilities in North Dakota and simultaneously the commission authorized two independent producers to sell natural gas to the pipeline company.

The commission had previously granted temporary authority to Montana-Dakota and the two producers, Amerada Petroleum Corp., Tulsa, and Signal Oil & Gas Co., Los Angeles, but when hearings on the applications were convened, the North Dakota Public Service Commission opposed the applications. The commission argued that the producers should require the dedication of a greater portion of Signal's and Amerada's residue gas for utilization within North Dakota.

MAGNESIUM for cathodic protection



More initial current output. New Galvomag magnesium anodes substantially step up current; provide more efficient protection. Long ten-foot Galvomag anodes will produce up to three times as much current as conventional 17-pound anodes.

GALVOMAG anode boosts current output

New Dow high-potential anode provides extra punch needed on well casings

Now you can give well casings and other underground structures the protection they need at a new low cost. High-potential Galvomag*, new magnesium anodes recently developed by Dow, generate more current—substantially more current—than conventional anodes. They provide effective protection with fewer anode units, thus reducing installation costs as well as maintenance costs.

Galvomag anodes are particularly beneficial in high-resistivity soils where large numbers of anodes were formerly required to provide the necessary protective current. The greater throwing power of Galvomag gives the extra punch needed for positive, efficient protection.

You'll be pleasantly surprised when you find out how little it costs to prevent corrosion with Galvomag anodes. Any of the Dow anode distributors listed below will be glad to give you complete information and technical assistance. Contact the one nearest you or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 377R-2.

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CALL THE DISTRIBUTOR NEAREST YOU: CATHODIC PROTECTION SERVICE, Houston, Texas • CORROSION SERVICES, INC., Tulsa, Oklahoma • ELECTRO RUST-PROOFING CORP. (Service Division), Belleville, N. J. • ETS-HOKIN & GALVAN, San Francisco, Calif. • ROYSTON LABORATORIES, INC., Blawnox, Penna. • STUART STEEL PROTECTION CORP., Plainfield, New Jersey • THE VANODE CO., Pasadena, California

you can depend on DOW MAGNESIUM ANODES DOW

pipeline news • *Cont'd.*

Amerada was authorized to sell residue gas produced in conjunction with oil from the Tioga-Beaver Lodge field in northwestern North Dakota and processed at Signal's Tioga plant. Signal received authority to sell residue gas, resulting from the processing at the Tioga plant of casinghead gas purchased from other producers.

Price of the gas in both sales is 9 cents/Mcf. The gas is dump gas which otherwise would be flared or vented. In addition, Amerada and Signal also have entered into "firm gas" contracts with Montana-Dakota covering the sale of residue gas from the Tioga plant at a price of 16 cents/Mcf, but for intrastate purposes only. Under both the dump and firm gas contracts, Montana-Dakota estimates it will purchase a total of 7,236,560,000 cu ft annually in 1956, with the amount increasing to 8,081,460,000 cu ft by 1958.

Part of the dump gas will go to North Dakota and part into Montana, with the overage either to be placed in storage in Montana for future use or to be used immediately on M-D's system in eastern Montana and the Dakotas.

The North Dakota commission attacked the applications on the utilization point and argued that the rates in both the 9- and 16-cent contracts were unjust and unreasonable.

Presiding Examiner Joseph Zwerdling pointed out that the total volume of the dump gas to be taken outside the state is estimated at 5,763,390,000 cu ft during 1956 while by contract the total volume of gas which Montana-Dakota proposes to bring in from outside is estimated at 3,800,450,000 cu ft. He said that while he understood the desire of the state commission to protect and conserve its gas resources, it was difficult to see how a denial of the applications would accomplish this objective. If the applications are denied, he continued, the dump gas will continue to be flared "and thus irrevocably lost for all purposes."

Commenting on North Dakota's contention that rate conditions should be made applicable to both contracts, Examiner Zwerdling pointed out first that the FPC has no jurisdiction over the sales made by Signal and Amerada under the 16-cent firm-gas contracts. He also concluded that there was no basis for any finding that the 9-cent price in the dump gas contracts is higher than the prevailing price level for comparable gas in the applicable pricing area, and that there was no evidence that Montana-Dakota's purchases under the dump gas contracts would have any substantial adverse effect upon its cost of service, or upon any other pipelines purchasing gas in the same area.

Non-operating producer denied sale transfer

Part of a certificate application by an independent producer who is not a party to the contract by which the sale is made to a pipeline company has been dismissed by a Federal Power Commission presiding examiner.

Presiding Examiner William J. Costello's ruling arose from a proceeding in which the producer, Nelson Bunker Hunt Trust Estate, was proposing to sell to one interstate pipeline company the natural gas from the same source as that which it is now selling to another. The estate filed one application on Oct. 25, 1954, requesting a certificate covering sales of natural gas which it produces in Texas to Transcontinental Gas Pipe Line Corp., Houston. The sale, however, actually is made by Sun Oil Co. under a processing agreement with the Hunt Trust.

Subsequently, in June 1955, the producer filed an amendment to this certificate application, stating that its request for authority to sell the gas to

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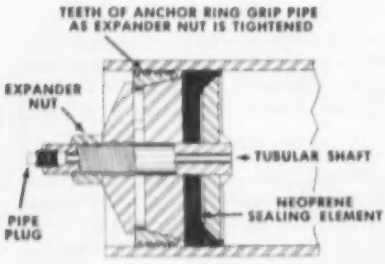
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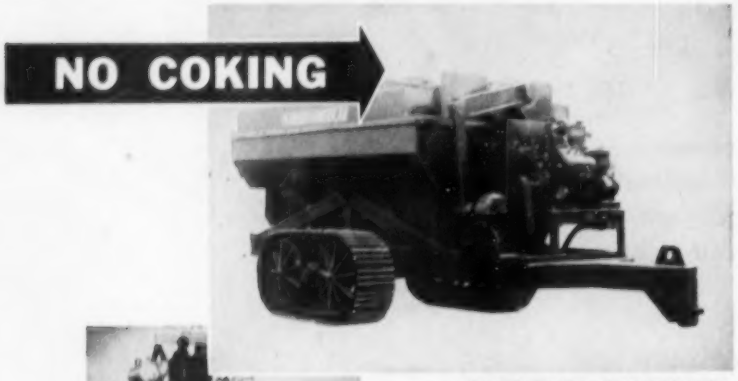
Transco was limited until July 15, 1955, and not afterward. At the same time, the trust filed a new application requesting authority to sell gas to Tennessee Gas Transmission Co., Houston. This application covered the same volumes of gas from the same source as that now purchased by Transco in the first application.

The trust also filed in June 1955 a notice of withdrawal of the portion of its October 1954 application relating to the sale of gas to Transco. This application also covered sales of gas by the trust to Arkansas Louisiana Gas Co., Shreveport. A certificate for this sale was granted.

The producer's request to withdraw the Transco sale part of its application was rejected by a letter dated July 1, 1955. An application for rehearing was filed and another letter was sent to the producer affirming the rejection. The ruling was subsequently appealed by Hunt Trust in the U. S. court of appeals for the fifth circuit.

The presiding examiner said that since the sale is being made by Sun, the merits of Nelson Bunker Hunt Trust's application "are not reached herein." In any event, he continued, "very fundamental questions relating to this proposal to transfer these volumes of gas . . . are before the courts now and it would be inappropriate for the examiner to take any position on these issues . . . even if the application had not been rendered inappropriate by the Humble order," which rejected 10 certificate applications by Humble Oil & Refining Co. because that company was the owner of non-operating working interests.

The examiner said that since the producer's June 1955 certificate application covers the sale of the same gas from the same wells as is involved in part of the first application, it must be dismissed since no application covering the termination of the sale to Transco has been filed.



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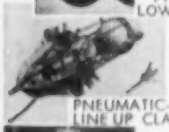
PNEUMATIC-INSIDE LINE UP CLAMP

PIPE CRADLES

GLASS, ASBESTOS AND KRAFT WRAP

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PERRAULT-AMERICAN 25 BBL KETTLE

Agitator mat bars scrape entire kettle bottom every 3.35 seconds, allowing no material to remain on bottom long enough to burn, eliminating coking completely. Mat motion is slow enough so dope is not "whipped." Heavy mat will not float, scrapes bottom thoroughly.

OTHER FEATURES: Actual capacity is 25 bbl.-plus; Completely insulated; Melts dope fast; Drain valve inside kettle requires no pre-heating; Burner gravity-fed, no pump required; Fuel is diesel oil; Fuel tank capacity is 50 gals. Perrault-American 25 bbl. Kettles give contractors the most economical, rapid, maintenance-free-and-easy service. Other sizes available. For more information write or phone.

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Pacific gets okay for direct industrial service

Plans of Pacific Northwest Pipeline Corp., Houston, to construct and operate 167.9 miles of lateral pipeline in Washington and 50 miles of new line in Colorado have received final approval from the Federal Power Commission.

Temporary authority granted in March allowed Pacific Northwest to increase the sizes of the previously authorized pipe to be used in its Walla Walla and Yakima-Wenatchee laterals to enable it to meet increased estimated requirements of customers to be served off the two lines.

The 50 miles of line in Colorado will be built to serve two direct industrial customers — Union Carbide Nuclear Co. at Uravan and Vanadium Corp. of America at Nucla.

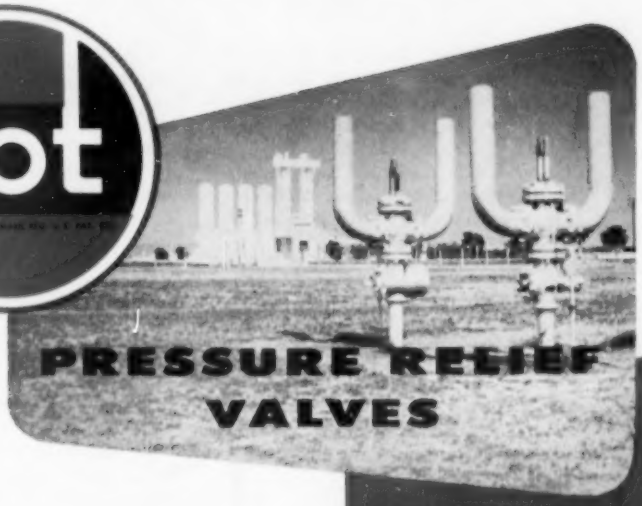
Iroquois' New York storage plan okayed

Development of a new underground storage area will result from an FPC certificate issued to Iroquois Gas Corp., Buffalo, N. Y.

Pipeline facilities, estimated to cost $2.9 million, are scheduled for Chautauqua, Cattaraugus, and Erie counties in New York.

The project involves the use of a former gas producing reservoir 3000 ft below the surface. Iroquois will build about 14 miles of delivery pipe, 22 miles of gathering and well lines, drill 16 wells, and reclaim or recondition 64 existing wells. A 900-hp compressor station is included in the plans. The Nashville storage area, as it is known, will contain approximately 8.5 billion cu ft per day and have a maximum output capacity of 80 MMcf/day.

got



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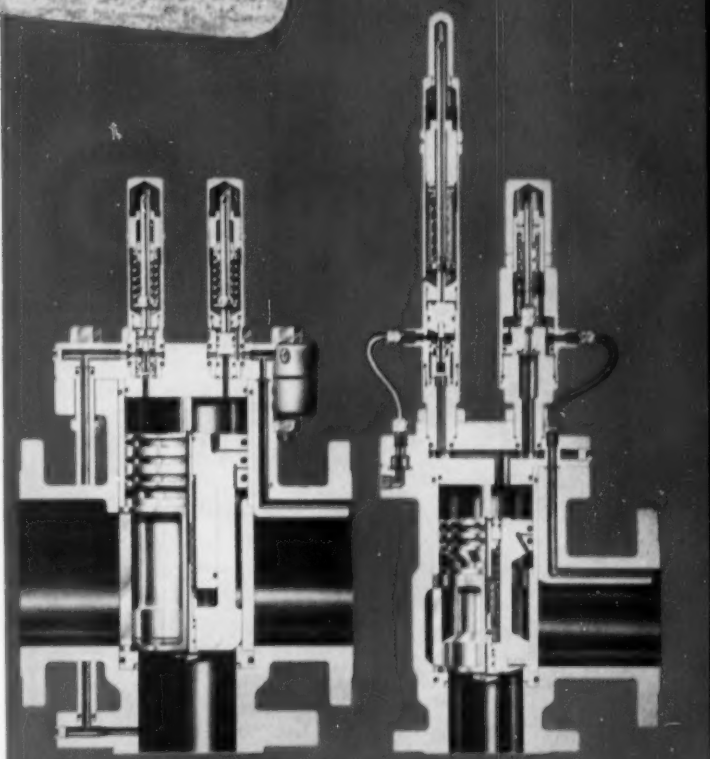
The need for a restricting nozzle at the seat is eliminated by the differential-area design of the Garrett Relief Valve, which gives *positive pressure control independent of velocity*. This feature, coupled with the long stroke of the plunger, provides greater relieving capacity than can be obtained with any other valve!

The long stroke of the plunger moves the seat disk completely out of the flow stream. Cutting at seat and disk is reduced to a minimum. Wire drawing, which is always present when a valve disk tends to throttle, cannot occur because the disk *always remains in full open position* until the re-set pressure is reached.

High relieving capacity and reduced seat maintenance are only two of the many features of Garrett Relief Valves. For the full story, write for Catalog No. 556 RV.



TYPE "D" VALVE
Pressure range: 150 to 5000 psi

TYPE "E" VALVE
Pressure range: 15 to 200 psi

Garrett Relief Valves are furnished in a complete range of sizes, 1" through 8". Pressure range, 15 to 5000 psi.

Standard trim uses Monel or stainless steel in all critical areas. Stainless trim or special alloys available.

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American Louisiana plans 36 billion cu ft increase

Shortly after receiving final approval to operate its Louisiana-to-Michigan transmission system, now nearing completion, and to allocate temporarily the entire 300 MMcf daily of initial delivery capacity, American Louisiana Pipe Line Co. announced its intentions to increase the capacity of its system by 36.5 billion cu ft of gas per year.

Although the new line is still under construction, American Louisiana wants to begin work on the additional facilities, which will boost system capacity to 400 MMcf/day. The new work will cost approximately $16 million, and will consist initially of additional compressors totaling 28,000 hp, which will increase the capacity by 60 MMcf/day. Two additional compressor stations with a total of 18,000 hp will go into operation by July 1, 1957. These will add another 40 MMcf daily delivery capacity.

In its application to the Federal Power Commission, American Louisiana said it has purchased an additional 1.2 trillion cu ft of natural gas reserves while its line has been under construction. As a result of these additional purchases, the company now has dedicated to it more than 4 trillion cu ft of gas reserves which will support the delivery capacity of the system at 400 MMcf/day for more than 20 years, the company said.

The current survey of the gas requirements of its affiliates, Michigan Wisconsin Pipe Line Co. and Michigan Consolidated Gas Co., both of Detroit, shows that American Louisiana's present capacity must be expanded if sufficient gas is to be made available for all who desire it.

In its approval of Docket G-2306, et al, the FPC temporarily allocated 200 MMcf/day to Michigan Consolidated and 100 MMcf to Michigan Wisconsin.

The order also authorized American Louisiana to construct and operate a 117-mile line from Payne, Ohio, to Bridgman, Mich., to provide a short and economical connection between the mainlines of American Louisiana and Michigan Wisconsin.

Michigan Wisconsin received authorization to construct about 252 miles of line and 3400 additional hp on its system.

In its opinion, the commission pointed out that the authorizations cover service only of the additional requirements of markets presently served by Michigan Wisconsin's 16 utility company customers and not the matter of other distributing companies which are seeking new service from either Michigan Wisconsin or American Louisiana.

Midwestern Gas Transmission Co., Houston, an intervenor in the proceedings, had argued that the FPC could not authorize the allocation of gas to

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SINGLE SPEED • MEDIUM DUTY

Extremely light . . . you can hold it in the palm of your hand . . . because the NEW TULSA Power Take-Off has a die-cast aluminum housing which at the same time gives all the ruggedness and durability for which the TULSA line is famous around the world. Output shaft available in three sizes—13/16", 7/8" and 15/16"—and rotates on two needle bearings. Furnished with either cable or lever control to suit individual operators' requirements. Designed and built for the full range of medium duty work, this new power take-off offers the extra advantage of low price, nationwide distribution and service that have made the TULSA line a favorite everywhere.

Tulsa Winch
TULSA, OKLAHOMA DIVISION OF VICKERS Inc.

K. P. M. Crrell (left), engineering representative of Arabian American Oil Co., and T. D. Williamson Jr., vice president of T. D. Williamson Inc., Tulsa, are shown making the final inspection of a large order of WmSON pipeline cleaning pigs (scrapers) to be shipped to Saudi Arabia for use by Aramco.

Announcing...

the amazing light-weight, compact

85 cfm GYRO-FLO

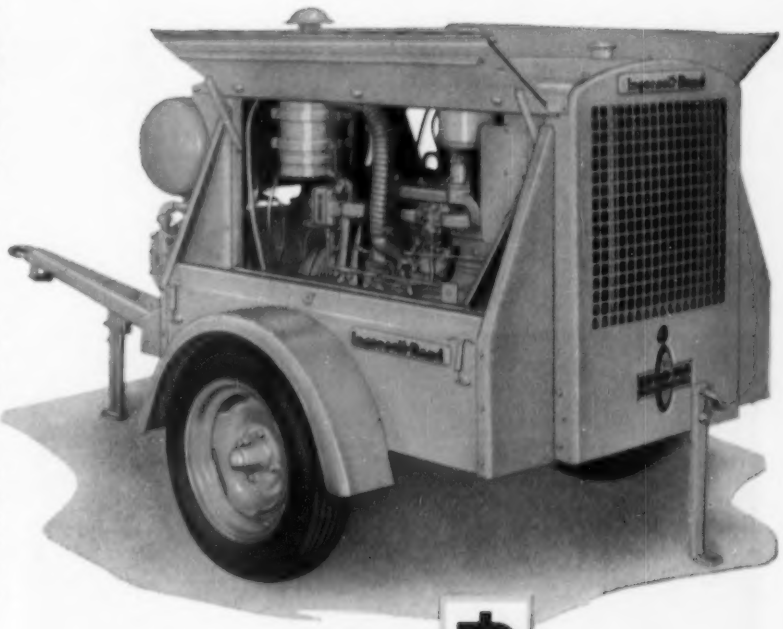
PORTABLE ROTARY COMPRESSOR

A new addition to the famous GYRO-FLO compressor line, this amazingly compact rotary delivers 85 cfm at 100 psi. It is by far the lightest portable compressor built in comparable capacity. Weighs only 1840 lbs—ready to go—fully equipped with tool boxes, fenders and two-wheeled spring-mounted running gear.

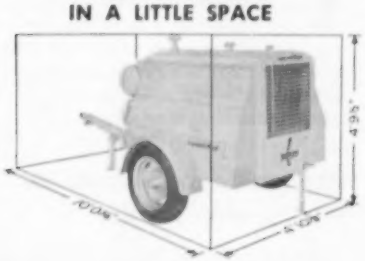
As a truck-mounted unit, the 85 GYRO-FLO weighs 1375 lbs and stands 42 in. high.

For your smaller jobs that need only 85 cfm of air power, this GYRO-FLO is certainly your best bet. It gives the same smooth, dependable, maintenance-free performance that characterizes GYRO-FLO compressors the world over.

With this new unit, the GYRO-FLO line now is increased to six sizes—85-125-210-315-600 and 900 cfm—the most complete line of portable rotary compressors available. See your Ingersoll-Rand representative for further details.



A LOT OF POWER IN A LITTLE SPACE



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GYRO-FLO Compressors and I-R Air Tools

Here's the complete line of GYRO-FLO heavy-duty portable compressors ...6 SIZES

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the present markets now because the American Louisiana-Michigan Wisconsin applications are competitive and mutually exclusive when considered with Midwestern's application. (Midwestern is proposing to build a pipeline system to serve markets in Wisconsin and Minesota, among others.) Some of the markets seeking gas from Michigan Wisconsin are competitive, in whole or in part, with Midwestern's proposals. The FPC, however, noting that Midwestern is not seeking to serve any of the 16 markets presently being served by Michigan Wisconsin, declared that Midwestern does not have grounds for complaint since the opinion and order related only to the 16 present markets. Decision with respect to the competitive markets was withheld.

The commission said that a deferral of decision on the question of gas sales by American Louisiana and Michigan Wisconsin to meet existing needs of the 16 existing customers, and the construction of necessary facilities, "until such uncertain future time as the questions raised by Midwestern's proposed service . . . are ripe for determination, would work a very real hardship on those present customers and the gas consuming public in this area, and would otherwise be contrary to the public interest."

The commission said that its permanent allocations of gas to Michigan Consolidated and Michigan Wisconsin total only 220 MMcf per day, leaving 80 MMcf for future disposition, "which safely exceeds any reasonable requirements for new markets." The third-year requirements of interveners and others seeking American Louisiana gas had been estimated at approximately 30 MMcf/day.

To insure that Michigan Wisconsin's utility customers will not attach firm loads on the basis of the gas which is only temporarily available, the commission conditioned its authorization to require Michigan Wisconsin to impose in its tariff certain provisions designed to limit its firm deliveries of the additional gas.

The FPC conditioned American Louisiana's certificate to require it to submit, at least 60 days prior to the commencement of service, a tariff satisfactory to the commission, and to submit a satisfactory financing plan for its Payne-Bridgman line before it commences construction.

In a concurrent order, the commission ordered hearings on requests by distributors seeking American Louisiana gas, but only in those cases which involve no competition with Midwestern's proposed service.

Commissioner William R. Connole filed a separate statement, concurring in the FPC's action except for the authorization of the Payne-Bridgman line. He said that at this stage of the record "when there still remains a question whether American Louisiana will be certificated to serve additional customers in Wisconsin, it seems precipitous and unnecessary to authorize this considerable expense when the eventual outcome of the entire consolidated proceeding might affect its design, or even render it unnecessary at all."

a reputation of integrity
skill and dependability...

Panhandle and Trunkline receive supply order

A recent Federal Power Commission order directs Panhandle Eastern Pipe Line Co., Kansas City, Mo., and Trunkline Gas Co., Houston, to supply a total maximum of 20 MMcf/day to 12 utilities and towns in Missouri and Illinois.

Panhandle was directed to supply the following companies and towns: Missouri Public Service Co., Warrensburg, 11 MMcf; City of Montgomery, Mo., 649 Mcf; Town Gas Co., Virden, Ill.,

Youngstown

OFFERS THE "BIG 5" IN ELECTRIC WELD LINE PIPE FOR OIL AND GAS PRODUCING AREAS...PROVEN AND READY FOR EFFICIENT SERVICE IN THE FIELD

Here are the "Big 5" reasons why Youngstown Electric Weld Line Pipe is your best buy:

1. It bends readily
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Terrain dictates some mighty peculiar contours. As an oil or a gas man, you're well aware of this. But, are you also aware of the secret of bendability of line pipe? It's simply the right combination of physical and chemical properties. Youngstown Electric Weld line pipe manufactured from uniform high quality steel, is capable of producing even smooth bends to fit any contour with uniform roundness. You know the importance of this—you know what this means on any job.

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Youngstown

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THE YOUNGSTOWN SHEET AND TUBE COMPANY Manufacturers of Carbon, Alloy and Yoloy Steel

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pipeline news • *Cont'd.*

895 Mcf; Missouri Central Natural Gas Co., Macon, Mo., 1.4 MMcf; Village of Westville, Ill., 1039 Mcf; Village of Pleasant Hill, Ill., 518 Mcf; City of Waverly, Ill., 644 Mcf; Village of Roosville, Ill., 643 Mcf; Central Illinois Electric & Gas Co., Rockford (for city of Delavan, Ill.), 626 Mcf; and City of Winchester, Ill., 613 Mcf.

Trunkline will supply 1.5 MMcf to the City of McLeansboro, Ill., and 517 Mcf to the City of Vienna, Ill.

The commission's order requires the companies and towns to construct their projects and to be able to receive service from Panhandle and Trunkline within one year.

Mountain Fuel signs up for Pacific Northwest gas

Mountain Fuel Supply Co., Salt Lake City, plans to file an application with the FPC seeking permission to build 38 miles of 20-in. line which will be needed to transport the 50 MMcf/day it is buying from the Pacific Northwest Pipeline Corp.

A 20-year purchase agreement has been signed by the two companies. Mountain Fuel will pick up the gas at the point where the Pacific line crosses the Mountain Fuel line in Sweetwater county in southern Wyoming.

Price Co. honored for safety achievements

H. C. Price Co.'s outstanding safety record in the field of pipeline construction has been honored by the presentation of two national safety awards by the U. S. Bureau of Mines through the Joseph A. Holmes Safety Association.

Two certificates of honor were confered upon H. C. Price for both the overall company record in 1955 and for the individual record of Construction Superintendent R. L. Ezell.

The Holmes award to the company was for establishing a safety record during 1955 which included less than one-fifth the number of lost-time accidents than averaged by the pipeline construction industry in general.

Superintendent Ezell's citation read "for having no lost-time accidents to the men under his supervision, from Nov. 20, 1953 to Nov. 30, 1955, and continuing, a total of 935,110 manhours—a record in pipeline construction."

Natural Gas Pipeline seeks supply from Texas field

About 20 MMcf of gas per day will be taken from the Quinduno field in Roberts county, Texas, by Natural Gas Pipeline Co. of America, Chicago, if it receives authorization from the FPC (Docket G-9934, et al).

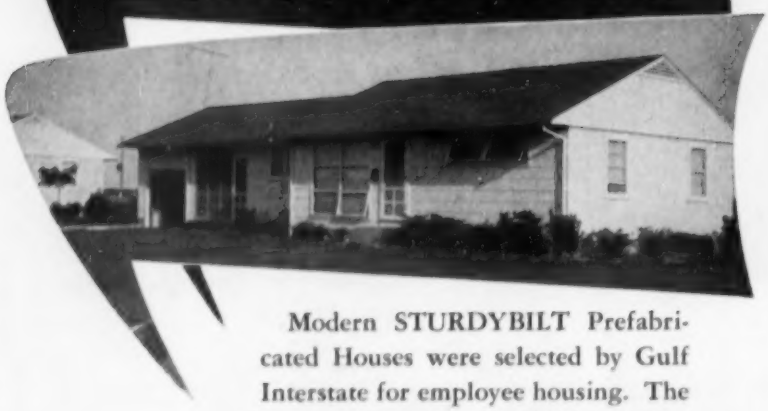
Natural is proposing to build about 25 miles of line extending from the field to a connection with its system, 5280 hp in field compressor stations, and various field lines and metering facilities for an estimated $3.2 million.

Related applications were filed by four independent producers proposing to sell the gas to Natural. Natural would buy approximately 13.5 MMcf/day from Gulf Oil Corp. and the remaining 6.5 MMcf would come from Shamrock Oil & Gas Corp., Superior Oil Co., and Sinclair Oil & Gas Co.

Settlement reached in Cities Service rate case

Within the next 30 days, approximately 50 wholesale customers of Cities Service Gas Co. in Texas, Oklahoma, Kansas, Nebraska, and Missouri will receive refunds from the company total-

another indication that
PREFABRICATED HOUSES
are best for
gas pipe line housing



Modern STURDYBILT Prefabricated Houses were selected by Gulf Interstate for employee housing. The houses were painted in different color combinations to give the community extra distinction.

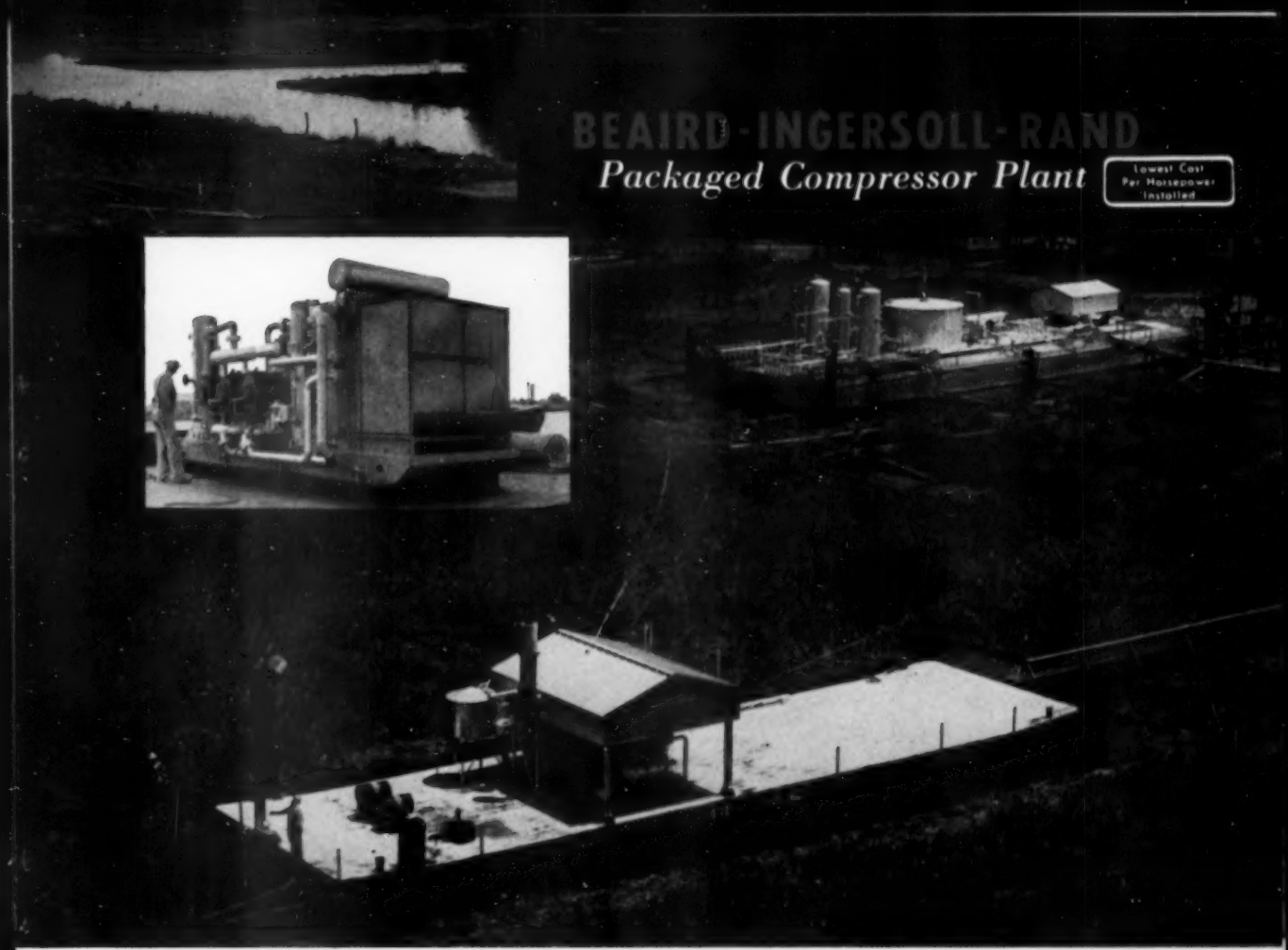
STURDYBILT Prefabricated Houses are best for industrial housing because they are quickly erected, durable, styled to suit modern families' tastes, and easily movable when necessary.

• MANUFACTURERS OF SPECIAL MILLWORK: DISTRIBUTORS OF CURTIS WOODWORK, and JOHNS-MANVILLE BUILDING MATERIALS •

STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA.

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES



GULF REFINING COMPANY BAYOU COUBA FIELD COMPRESSOR STATION—equipped with a Beaird-Ingersoll-Rand 165 h.p. 6 JVG four cycle gas engine driven compressor, Young radiator with lubricating oil cooler and gas coolers, and all necessary controls for unattended operation. Other sizes 110 to 660 h.p.

Packaged Compressor for —

BARGE MOUNTED GAS LIFT SERVICE

Gulf Refining Company has installed this barge mounted compressor station in Bayou Couba Field, Louisiana. Part of a 21-well gas lift operation, the 165 h.p. 6 JVG Beaird-Ingersoll-Rand packaged unit was added to supplement three high gas-oil ratio wells formerly used to produce the field. Picking up from the lifted wells at 50 psig., the compressor boosts the gas into the injection system at 825 psig. where it is joined with make-up gas drawn from the high ratio wells. By using a closed gas lift system Gulf has stopped flare gas losses and extended the life of the high gas-oil ratio wells.

Completely packaged and on its own skid base, the unit was installed on a conventional cargo barge. Piping and plant layout has been designed to facilitate the economical addition of a second compressor to the station when required.

Fully automatic in operation, the compressor is equipped with speed and pressure regulators which permit it to swing with changes in line pressure by varying the engine speed through a range of 50% to 100%. Other controls watch over the unit day and night ready to shut it down should any unusual operating condition occur. Only routine scheduled inspection and maintenance is required for 24-hour unattended operation.

Let us tell you about the economy of using Beaird-Ingersoll-Rand packaged compressor plants for offshore and tidelands production.

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MANUFACTURING
STEEL WAREHOUSE

BEAIRD

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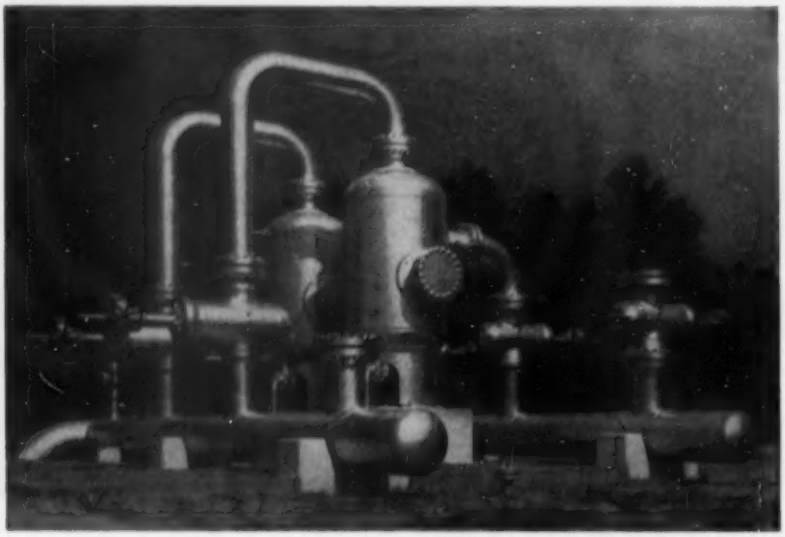
pipeline news • *Cont'd.*

ing approximately $6.3 million plus 6% interest.

Settlement of the long, drawn-out rate proceeding was reached following conferences attended by all parties. Provided in the settlement is a $10.2 million increase based on Cities Service 1955 sales in lieu of a total increase of $17.8 million proposed in two requests filed with the Federal Power Commission.

Also resulting from the settlement is the termination of a rate suspension proceeding and a general rate investigation of a Cities Service subsidiary, Cities Service Gas Producing Co., also of Oklahoma City. Although the producing company's suspension proceeding was terminated, the FPC specified that the action was not to be construed as recognition that the rates "are just and reasonable or otherwise." An $885,476 annual increase in rates to its parent had been proposed by the producer; the rates will remain in effect under the agreement.

The settlement also provides that Cities Service shall not file any general rate increase within one year from April 21, 1956, unless within that period plus six weeks immediately thereafter the company has incurred, or will incur within six months from date of filing, increased costs which would result in a deficiency of $1 million or more from jurisdictional business.



Manifolded to provide a capacity of 200 MM SCFD at 650 psig with a pressure drop of 1.5", these Aerotec units remove both dust and liquids from the gas.

AEROTEC **GAS SCRUBBERS**

designed to remove solids or liquids

On this 845 mile, 30" feeder line from Louisiana to West Virginia, five compressor stations present wide variations in contamination of gas being transported.

At some stations, the scrubbing problem presented is one of dry dust removal. All others, fluid carryover requires the removal of dust and liquid. Aerotec Scrubbers for these compressor stations were designed to handle the conditions encountered at each station. Resulting gas delivered to the 8000 horsepower compressors is dry and free from abrasive dusts.

Aerotec Gas Scrubbers are noted for their ability to deliver gas, free of fluid carryover. No liquids used in the scrubbing process makes this possible. Temporary overloads of up to 100% are easily handled without efficiency loss.

Contact our project engineers today. Ask for Thermix Data Sheets.

Project Engineers **THE THERMIX CORPORATION** Greenwich, Conn.
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Canadian Affiliates: T. C. CHOWN, LTD., 1440 S. Catherine St. W., Montreal, Que.

Manufacturers
THE AEROTEC CORPORATION
Greenwich, Conn.

GAS news notes

A constitutional amendment introduced in the Louisiana house would create the office of Louisiana pipeline commissioner to regulate gas pipelines. The bill would also transfer the common carrier pipeline authority of the Louisiana Public Service Commission to the new office.

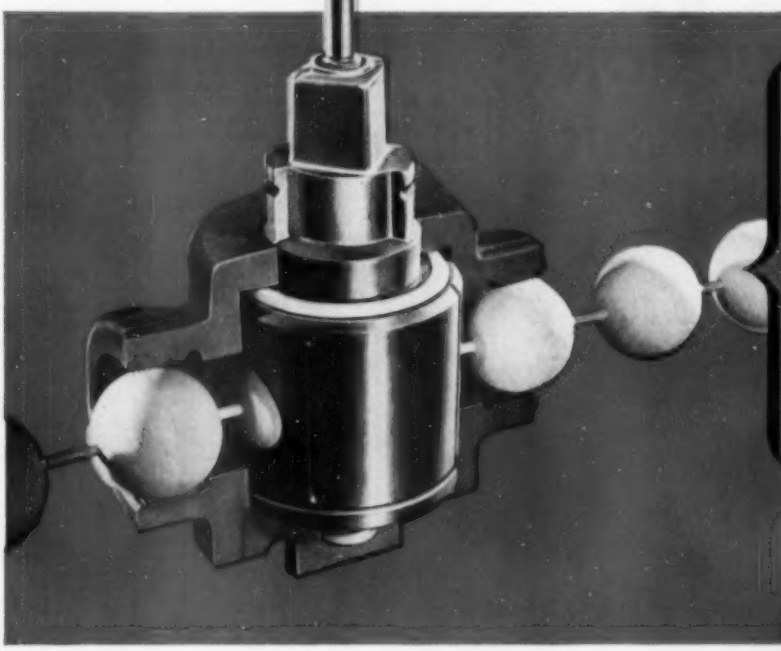
Northern Natural Gas Co., Omaha, wants to lay 28 miles of 24-in. pipe from Ogden, Iowa, to Redfield in order to make a full-scale test of its gas storage project near Redfield. Plans also call for modification of three compressor units at Ogden. Testing must be done during the summer months, when the system normally operates at part capacity.

Charles Wilkins, executive vice president of the Mid-Continent Gas & Oil Association, has warned that a proposed Louisiana tax hike on natural gas poses a threat to the state's industrial expansion. He said the bill, which would up the gas gathering tax from 1 to 3.5 cents/Mcf, might scare away prospective industrialists. Income from the hike would be dedicated to public school teachers' pay increases.

Piedmont Gas Co., Hickory, N. C., wants the Federal Power Commission to direct Transcontinental Gas Pipe Corp., Houston, to supply it with natural gas. Piedmont's proposed service area would extend generally northwest from Stanley to Morganton and Lenoir, and would include Gaston, Lincoln, Catawba, Caldwell, and Burke counties. Piedmont wants Transco to supply 5.5 MMcf/day of the 5,953,000 cu ft anticipated requirement.

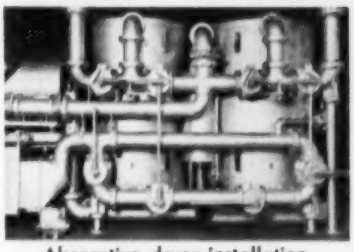
Contracts totaling more than $2 million for the construction of natural gas pipeline extensions have been awarded by the Saskatchewan Power Corp., Regina. Fulton-Banister Co., Edmonton, will build a 120-mile line from the Success field to Moose Jaw, an extension to the Hoosier field and a gathering system there, and a 16-mile line from the Brock gas field at Eston, Sask. Fulton-Banister will also build a transmission line from Biggar to North Battleford and from Dana to Humboldt.

acf Lubricated Plug Valves

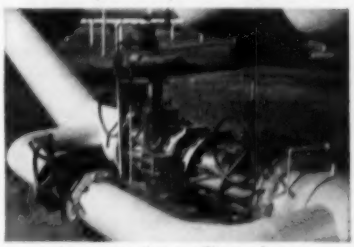


ROUND PORT MEANS FREE FLOW ALL THE WAY

In salt water disposal plant.



Absorptive dryer installation.



In natural gasoline plant.

You get full volume, unrestricted flow throughout the entire piping system when you use acf Round Port Valves.

The pipe-matching port openings cause no loss in head pressure—offer no more resistance to flow than the pipe itself. There are no obstructions—no turbulence and no harmful abrasive effects from solids in suspension. Even the most heavy viscous ladings flow freely through acf Round Port Valves.

Split-second quarter-turn shutoff, non-wedging cylindrical plug, Teflon* head gasket, are additional advantages that add to perfect performance of acf Round Port Valves—that mean extra long trouble-free service—lower maintenance costs and fewer work stoppages.

Act now to step up valve performance—to keep maintenance costs down. Representatives in 50 principal cities.

*DUPONT TRADE NAME

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PIPE LINE HALF SOLES

SLEEVES

ON THE JOB CONSTRUCTION

CONCRETE RIVER WEIGHTS

One of the many Edwards Concrete River Weights installations on Texas-Illinois Natural Gas Pipeline.

Edwards Split Welding Sleeves also used on the line to insure perfect joints in swamps, rivers and safety zones.

PIPE LINE, REFINERY & GASOLINE PLANT EQUIPMENT ENGINEERS

Allan Edwards, Inc.

2445 S. Jackson — P. O. Box 7218
Tulsa, Oklahoma
Phones: DI. 3-7184 - DI. 3-8390

Continued from page 120

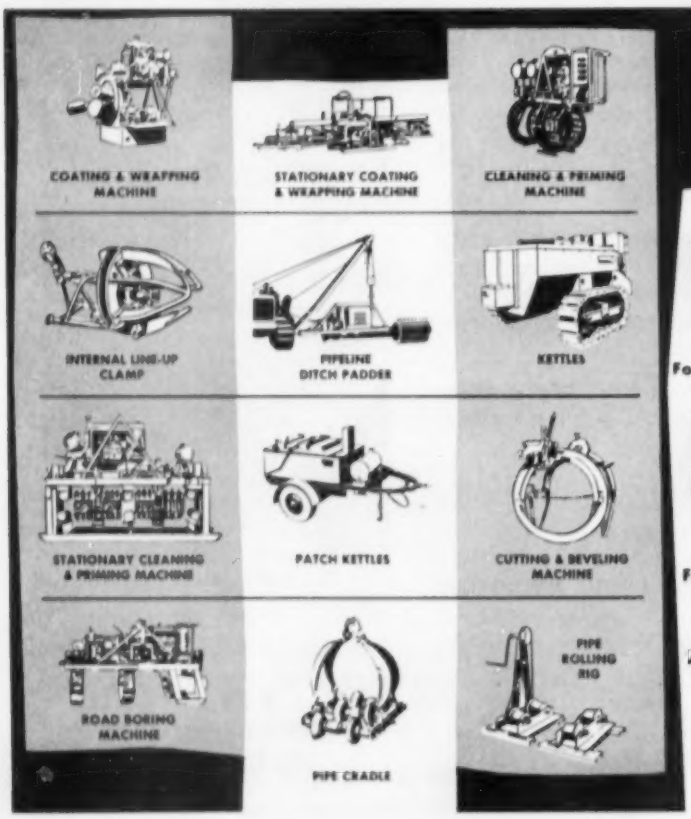
miles. Completion scheduled for fall of '56. Total construction by April: 1017 miles of mainline lowered and 276 miles of laterals and gathering systems.

PERMIAN BASIN PIPELINE CO., Omaha. Docket G-9688 and 9724. For 19-mile, 16-in. line and 6750-hp compressor station in Andrews county, Texas, to take gas from Phillips gasoline plant. Gasoline Plant Construction Corp., Houston building compressor station; R. H. Fulton the line.

TEXAS GAS TRANSMISSION CORP., Owensboro, Ky. Docket G-8828 for 189 miles of line and 19,190 hp in compressor capacity along its system in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Indiana. Contracts for 10,820 compressor hp let to Longview Equipment Co. and 7500 hp to Ford, Bacon & Davis. Compressor construction begun. Work completed on 9.2 miles of pipe, contracts let on remainder to Houston Contracting Co., Williams Brothers Co., and Union Construction Co.

TENNESSEE GAS TRANSMISSION CO., Houston. Docket G-2534, et al, to build approximately 220 miles of 26- and 30-in. mainline loops paralleling its system in Kentucky and Ohio; installation of 12,540 hp additions; and 376 miles of line required to connect its new gas supplies, 355 of which will comprise an extension of its system into southeastern Louisiana. About 75% of pipe lowered in on Louisiana portion as of June 5. Completion scheduled for early summer.

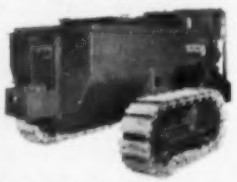
WESTCOAST TRANSMISSION CO. LTD., Calgary. To build 650-mile, 30-in. line from Peace river area to near Vancouver, B. C., to connect with line of Pacific Northwest Pipeline Corp., to transport 370 MMcf daily, of which 300



CROSE—LITTLEFORD
MODEL 211-10-P2
PIPE LINE KETTLE

10 barrel capacity, complete with hydraulically controlled agitator, and adjustable low pressure burner, self starting air cooled engine. Especially designed for contractors, or companies, who require an efficient heating kettle with less capacity, or as an auxiliary patch kettle for "Big Irish" jobs. This kettle is at home on the highway or tough pipeline terrain.

For transporting on highway



For tough pipeline terrain

The J. Crose Manufacturing Company, Inc.

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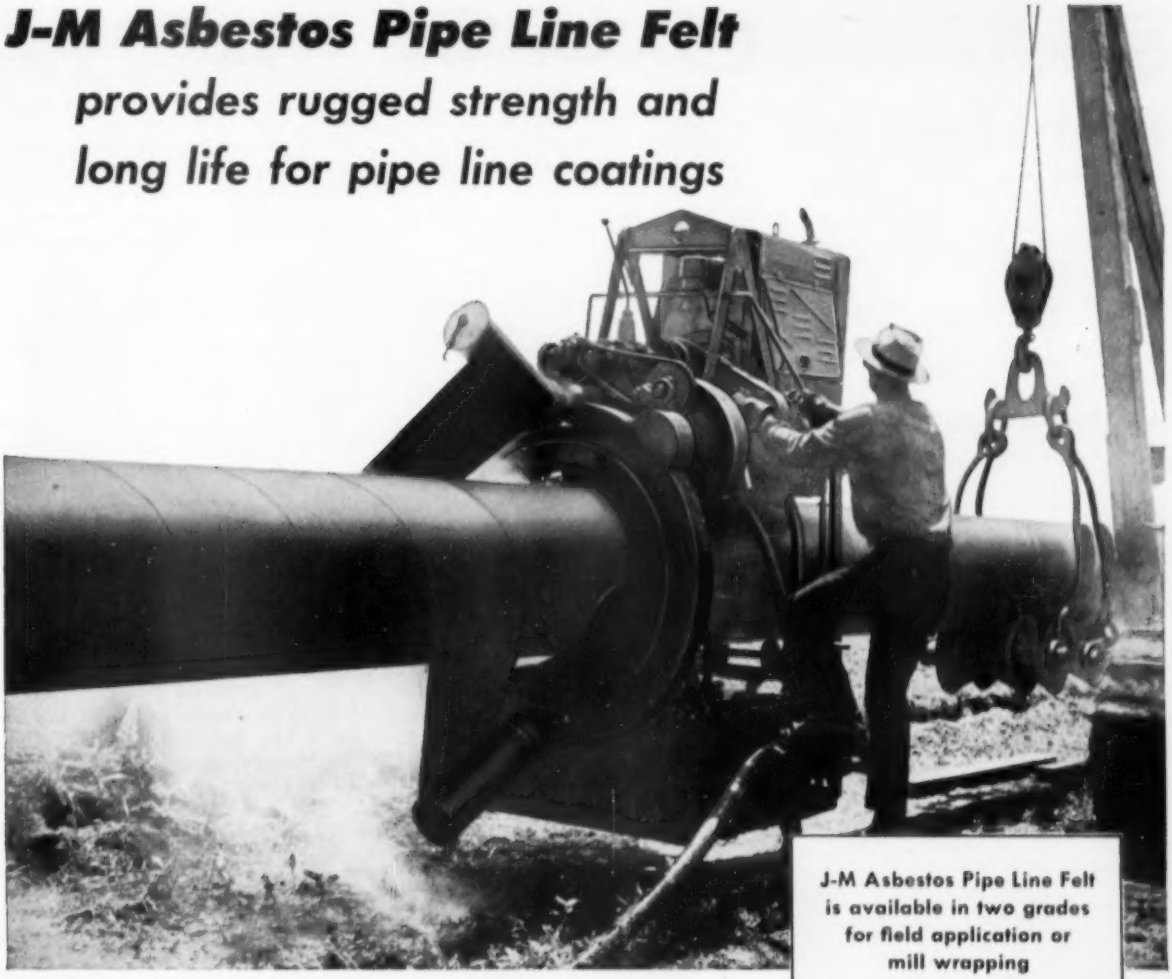
J-M Asbestos Pipe Line Felt

provides rugged strength and long life for pipe line coatings



Permits high-speed wrapping and effective protection for enamels

Johns-Manville Asbestos Felt gives pipe line coatings the rugged strength that is needed to guard the enamel from years of soil action. It forms a *stable* coating to reduce the hazards of pipe line corrosion leaks and provides a sound foundation when cathodic protection is used. Inorganic asbestos felt is the only wrapper that has survived more than half a century of actual service conditions in all types of soils.

J-M Asbestos Pipe Line Felt acts as a continuous sheath over the enamel . . . guarding the coating from the effect of the shifting grip of the soil as it expands and contracts due to alternate wetting and drying. It resists the destructive action of bacteria, fungi and soil chemicals, thus assuring long life to pipe line coatings.

J-M Asbestos Pipe Line Felt is available in two grades for field application or mill wrapping

Transhield Asbestos Pipe Line Felt—for average soil conditions.

#15 Asbestos Pipe Line Felt—heavy-duty material for severe soil conditions where a heavier material is desired.

For further information about Johns-Manville Products for Pipe Line Protection, write to Johns-Manville, Box 60, New York 16, N. Y., in Canada, Port Credit, Ontario.

Johns-Manville **ASBESTOS FELT FOR PIPE LINE PROTECTION**

MMcf is to be delivered to PNW. Work has commenced on all four sections between Peace river and International Border. Scheduled for completion in 1957.

APPROVED

IROQUOIS GAS CORP., Buffalo, N. Y. Docket G-9667 for 14 miles delivery pipe; 22 miles gathering and well lines; 16 new wells and 64 reclaimed and reconditioned wells; 900-hp compressor station to develop underground storage area in Chautauqua, Cattaraugus, and Erie counties, N. Y.

MICHIGAN WISCONSIN PIPE LINE CO., Detroit. Docket G-2327 for approximately 251.9 miles of 24-, 18-, 12-, 6-, and 4-in. loops and 3400 hp additional at existing compressor stations in Illinois.

GAS pipeline people

WILLIAM F. JOHNSON has succeeded JOSEPH F. DAVIDSON as director of sales of Consolidated Electrodynamics Corp., Pasadena, Calif. Mr. Davidson has become marketing vice president of Arnoux Corp., Los Angeles.

CLINTON F. HEGG, vice president of the L.O.F. Glass Fibers Co., Toledo, has been named general sales manager of the company, replacing J. M. JOHNS, who has resigned.

Texas Gas Corp., Houston, has named DR. WILLARD M. DOW director of research. In his new position, Dr. Dow will head up a program which will result in the recovery of many petrochemicals from the company's immense gas reserves on the Texas Gulf Coast. Dr. Dow comes to Texas Gas from United Gas Corp., Shreveport, where he was assistant director of research.

A. A. WHITE, general counsel of Texas Gas Corp., Houston, has been elected secretary of the company.

JOHN L. SALLADIN has been appointed field sales representative for RCA microwave radio equipment in the eastern region. He will headquarter in RCA's Camden, N. J., offices.

ALBERT K. MITCHELL, rancher of Albert, N. M., was elected to the board of directors of Colorado Interstate Gas Co., Colorado Springs, at the annual stockholders' meeting held recently.

R. C. FREDERICK, vice president of gas sales and purchase of Pacific Northwest Pipeline Corp., Houston, has resigned.

JOE W. HANCOCK, who completed 20 years with the company last November, has been named superintendent of drilling for Natural Gas Pipeline Co. of America, Chicago. His appointment became effective with the retirement of CHARLES I. GALLOUP.

VOLNEY H. KYLE JR. has resigned as vice president and manager of operations of Michigan-Wisconsin Pipe Line Co., Detroit. He will engage in consulting engineering activities at 503 Washington Rd., Grosse Point, Mich.

Midwestern Engine & Equipment Co., Tulsa, has elected WILLIAM F. WINKLER as vice president in charge of sales. The company also announces the appointment of ROBERT KARLOVICH to the post of secretary-treasurer.

R. Karlovich W. F. Winkler
Midwestern Engine

Extreme Weather Conditions?

Call for PLICO Engineered Pipe Enamels!

Whether you're burying your pipe in the burning sand of the Colorado desert or lowering it into a frozen ditch in the Rockies, there's a Plico Pipe Enamel that exactly suits your corrosion-protection requirements.

Many years of experience in solving underground corrosion problems for almost every major pipeline company in America give Plico coating engineers the background to lick the trickiest jobs. Plico enamels are available at strategically located plants across America, which means low freight rates to your job site. Send for complete reports on the wide variety of projects Plico has handled for some of the biggest companies in the business!

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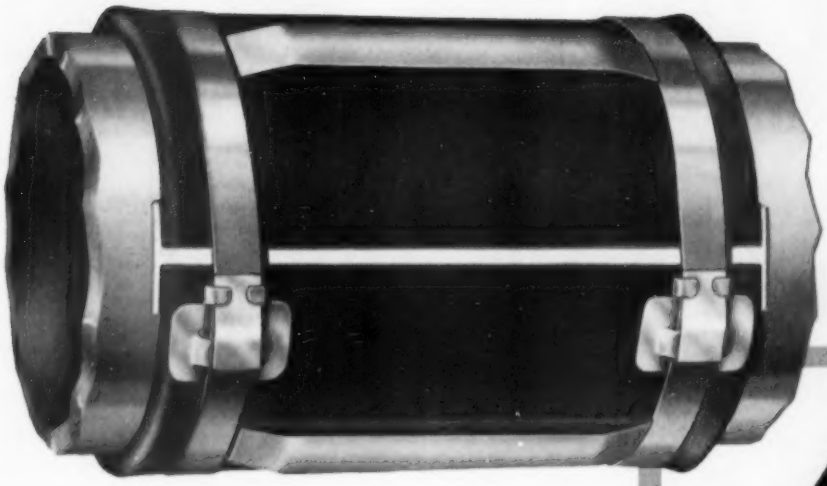
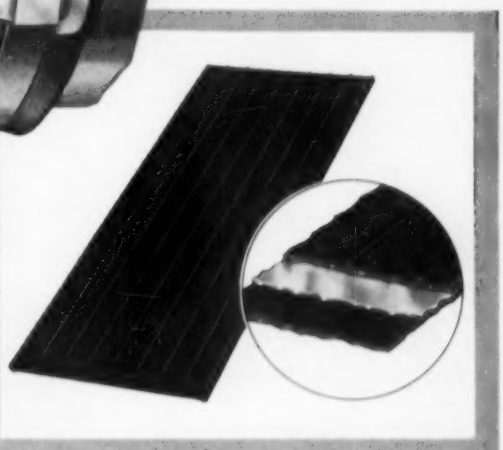
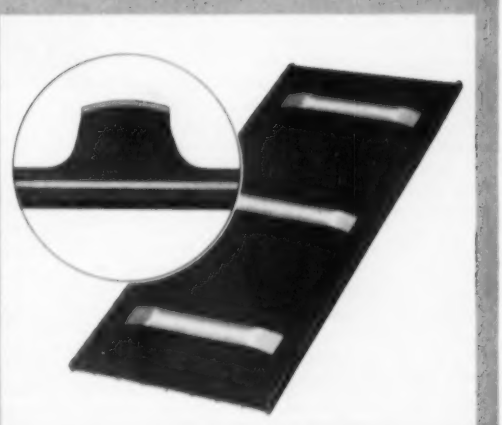
for the tight jobs



2" through 12"



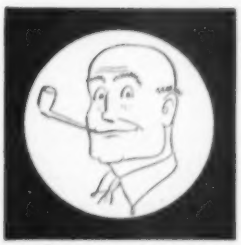


The "Maloney Model 56" Casing Insulator

Manufactured with Neoprene, which is vulcanized to the steel band core and to the rounded steel runners, there is no place to "short-out" between the casing and the carrier line. The steel core is completely surrounded with Neoprene and is bonded under heat and pressure to give the same strength as on army tank tread blocks.

Shipped flat, the Insulator is easily field formed and banded to the carrier pipe with stainless steel bands. Joint is sealed with a Polyethylene band.

Manufactured in sizes from 2" through 12", it can be used either on installations where there is only one nominal pipe size difference or on installations having a larger differential.



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METAL — PLASTICS

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Experience can keep you out of trouble in fighting corrosion, too.

Why gamble with "unknown quantities" when it comes to protecting pipe, pipe joints, couplings and other vulnerable surfaces above and below ground?

Since 1941, TAPECOAT, the quality coal tar coating in handy tape form, has demonstrated its ability to withstand corrosion year after year. In case after case, TAPECOATed lines have been dug up after 10 years of service *with no signs of deterioration on the pipe surfaces uncovered.* That's why TAPECOAT is specified by those who know that continuing protection is the first consideration.

Everything considered, you'll be money ahead by using TAPECOAT to give you the quality protection you need for reduced maintenance and replacement cost.

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The TAPECOAT® *Company*

Originators of Coal Tar Coating in Tape Form

1535 Lyons Street
Evanston, Illinois

M. E. Maddox **John Wilson**
Midwestern Pipeline

JOHN WILSON has been elected vice president in charge of sales for Midwestern Pipe Line Products Co., Tulsa. He has been with the company for nine years.

Midwestern Pipe Line Products Co., Tulsa, has appointed M. E. MADDOX as district sales representative for the firm's midcontinent area. He will headquarter in Tulsa and will cover Nebraska, Kansas, Missouri, Arkansas, eastern Oklahoma and Fort Worth and Dallas in Texas.

EARL AINSWORTH, a 27-year veteran in the oil and gas industry, has been named assistant to the manager of gas purchases for Northern Natural Gas Co., Omaha. He has been with Northern since 1949.

Earl Ainsworth **E. C. McGraw**
Northern Transco

E. CLYDE MCGRAW has been elected to the board of directors of Transcontinental Gas Pipe Line Corp., Houston. Mr. McGraw has been executive vice president since last November.

A. L. ROBERTS, general superintendent of operations for Texas Gas Transmission Corp., Owensboro, Ky., has been elected a vice president. He will continue his present duties. The company has also announced the appointment of JAMES E. GRUBBS as assistant superintendent of dispatching. He will

Youngstown (Ohio) Sheet & Tube Co. has appointed R. P. BROADHURST district sales manager in Chicago and C. HIX JONES district sales manager in Dallas. Mr. Jones succeeds FRANK D. CARROLL, who is retiring after almost 40 years of service with the company.

O. B. Williams **B. J. Gross**
W-K-M Manufacturing

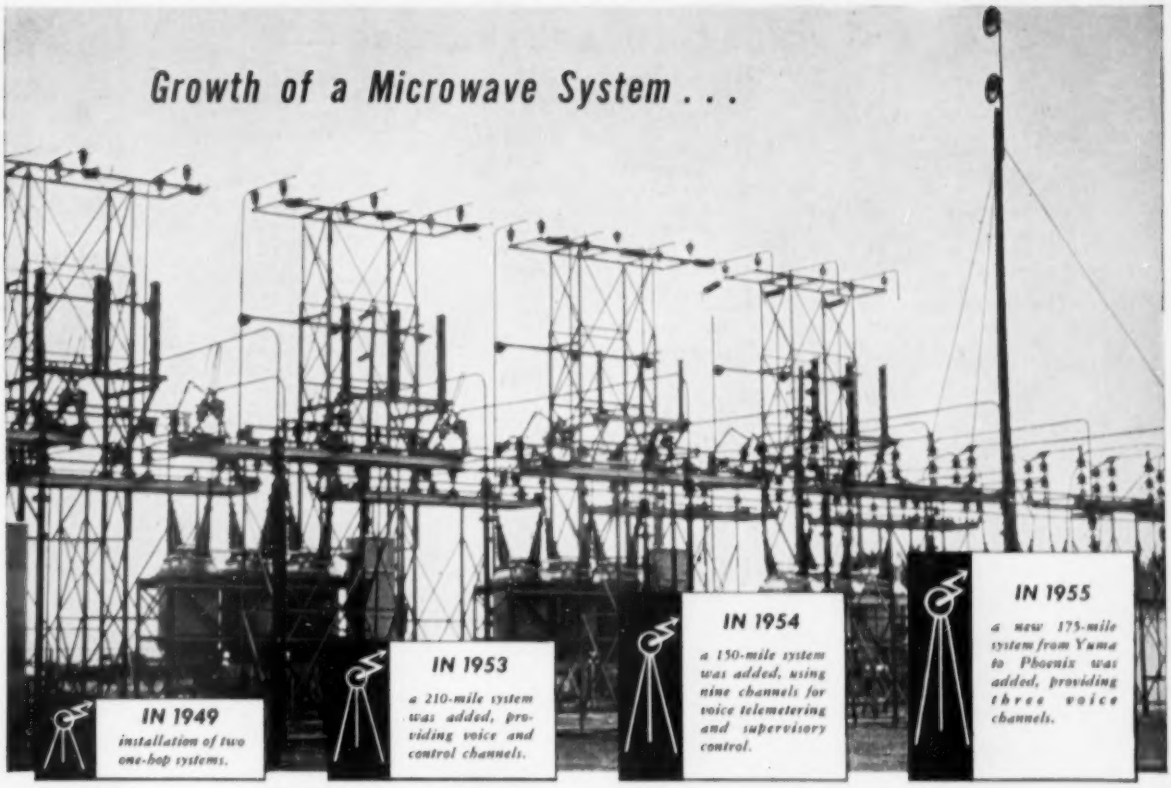
O. BLISS WILLIAMS has been named director of industrial and public relations of W-K-M Manufacturing Co., Houston. He was formerly assistant to the president of the Key Co., which became part of W-K-M recently. The company has also announced the election of B. J. GROSS as vice president for marketing. Mr. Gross headed the Key operation before the consolidation.

Several promotions in the Worthington Corp.'s engineering department, Harrison (N. J.) division, have been announced. E. C. SCHMACHTENBERG, formerly assistant to the manager of engineering and chief engineer, compressors, is assistant to the manager of engineering. HUNT DAVIS, former chief engineer, compressor development, is chief engineer, compressors. C. A. MACALUSO, formerly assistant manager, research and development, has been named assistant chief engineer, compressors, and W. F. DONOVAN, formerly group supervisor, research, succeeds him in his former position.

A. GONZALEZ-FLORES has been appointed sales representative for the Republic of Mexico by J. F. Pritchard & Co. of California, Kansas City, Mo.

AUSTIN E. OLSON has been made industrial communications engineer for Motorola Communications & Electronics Inc. in California, Arizona, and Nevada. He will headquarter in San Mateo, Calif.

WILLIAM H. JOHNSON and EDWARD E. SCHILLING have joined the research laboratory staff of the Fluor Corp. Ltd. at Whittier, Calif. Other personnel changes at Fluor include WILLIAM R. WALKER, named public relations supervisor; WALTER E. TERRY, supervisor of advertising; ROBERT L. WHEELER, supervisor of employee relations; J. D. DE MARAIS, supervior of employee relations of Flour's midcontinent division. JACK MC KAY, manager of advertising and sales promotion, is leaving the company.


Growth of a Microwave System . . .
IN 1949
installation of two one-hop systems.
IN 1953
a 210-mile system was added, providing voice and control channels.
IN 1954
a 150-mile system was added, using nine channels for voice telemetering and supervisory control.
IN 1955
a new 175-mile system from Yuma to Phoenix was added, providing three voice channels.

They Chose RCA Microwave Every Time Because of Its DEPENDABILITY

. . . for growing multi-station system at Arizona Public Service Co.

The original installation at Arizona Public Service Company in 1949 consisted of two RCA one-hop systems used to control unattended substations from the central steam-electric plant at Phoenix. Additional RCA systems were installed in 1953 and 1954, and again in 1955.

This steady growth with RCA Microwave—to the present multi-hop system—attests to its proven performance under the most trying conditions . . . including ambient 140 degree heat, high winds, severe electric and dust storms and violent rains.

Here also is proof of its ease of adaptability to future requirements. Through the years the dependability of this equipment has been virtually 100%. Completely independent of the transmission lines it services, it provides unfailing communications and control when needed most.

You can be sure of your microwave system's dependability if you first seek the advice of microwave engineers at RCA . . . world leader in radio and electronics. RCA equipment uses easy-to-service, familiar circuits and readily available tubes. It can interconnect with existing telephone lines, switchboards and mobile radio installations. Only RCA Microwave systems provide so many advanced engineering features. Get complete data.

RCA Microwave Specialists will be glad to answer any questions and help plan your installation. Mail coupon for further particulars on use of Microwave in utilities, pipelines, turnpike and other applications.

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POINT-TO-POINT COMMUNICATION

Performance proved in more than a million channel miles of operating systems throughout the world.

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BS&B Now Offers This New Better-Than-Ever Model MDH

Improved DC Knockout, designed along new principles, effects maximum scrubbing efficiency. Eliminates wax and salt water problems.

Efficient heat exchanger, designed specifically for this unit, achieves maximum cooling with minimum pressure drop through counterflow with cold sales gas.

Improved Separator design effects maximum separation of liquids, hydrates and gas.

Skid mounted in a compact assembly that permits shipment of the completely assembled unit. Field hook-up requires only four connections.

BS&B COLD-FRAC SYSTEM

No matter how good a new piece of BS&B equipment may be when first introduced, we are constantly seeking ways and means, born of our field experience and engineering know-how, to make it even better.

While other manufacturers are still offering the same low temperature separation systems they started out with, BS&B can now offer this proved *new* Model MDH COLD-FRAC System with improved features.

For the small lease operator, the BS&B ECON-O-MAX unit offers the same improved separator design as the larger MDH unit. Ask your BS&B Representative for details.

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